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Exploring Facebook users' willingness to accept f-commerce using the integrated unified theory of acceptance and use of technology 2 (UTAUT2), trust and risk under the moderating role of age and gender

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Abstract

What are the factors that influence consumers' intention to participate in Facebook commerce (f-commerce)? Are the factors the same across all ages and genders? To answer these questions, I i) developed a theoretical framework based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model, Trust and Risk, ii) tested the proposed model using Partial Least Squares Structural Equation Modelling, and (iii) interpreted and considered the implications of the results. The results show that consumers' trust in Facebook, performance expectancy, and perceived risk have significant impacts on their purchasing decisions. For young adults (aged 18-24 years old), trust has more influence on behavior intention while performance expectancy has a greater role among working adults (25-32 years old). Although facilitating conditions and habits do not have a significant relationship to behavior intention, their influences vary among females and males. Among females, the influence of facilitating conditions is more significant on behavior intention, while the effect of habits is more influential among males. Nevertheless, the differences among these groups are not significant, thus the findings can be applied to practically any group and e-vendors are not require to create separate programs to accommodate each group.

Keywords: UTAUT2, Perceived risk, Trust, Facebook, f-commerce, s-commerce.

Introduction

Today, social media has transformed into a powerful business tool. It presents businesses an innovative and exciting medium for reaching customers and enriching customer relationships. The most popular social network, Facebook, has 1.79 billion monthly active users world-wide (Statista, 2016) and 37 million users in Thailand (ThaiTech, 2016). Its large number of users are potential consumers for a company to market their products to. Many companies and retailers use Facebook for transaction-based commerce activities. This has given rise to "f-commerce", a subset of social media commerce which uses Facebook as the platform to facilitate and execute sales transactions (Kang & Johnson, 2015).

Because of its huge potential and popularity, a number of recent studies have examined different issues in f-commerce, such as f-commerce acceptance (Gatautis & Medziausiene, 2014), social factors in f-commerce (Hajli, 2014), service-quality in f-commerce (Wu, Shen & Chang, 2015), FB purchase intention (Ng, 2013), and design features (Huang & Benyoucef, 2013). Despite the recorded studies in f-commerce, currently this area is still a sparsely researched area (Zhang, Lu, Gupta & Zhao, 2014) and continuing study of f-commerce to verify how users' attitudes towards Facebook will influence their intention to adopt f-commerce should be considered a significantly important area of interest.

On top of that, Facebook is not limited to a certain particular user group but, rather, have expanded their reach to a wide variety of user groups. Previous studies in e-commerce (Grant, 2004, Kwon and Noh, 2010) have focused heavily on the youth segment, because traditionally the online marketplace has been dominated by youngsters. However, a considerable number of recent studies have revealed that as age and gender differs, so do the motivations and uses of social media (Muscanell & Guadagno, 2012). This clearly suggests that age and gender differences do exist in the way today's technologies are utilized and, for that reason, the present study investigated age and gender differences behind the determinants to participate in f-commerce

This study is based on Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh, Thong & Xu, 2012), a new model which is used to explain individual acceptance of new technology. Given the importance of trust in e-commerce, trust and its' affiliated factor, perceived risk, were incorporated into this model.

In summary, the objective of this study was to address two research questions: (1) Which factor(s) determine the adoption of f-commerce? (2) Do age and gender act as key moderators in this model? The main goal of this study was, therefore, to contribute more understanding of the best ways to understand f-commerce adoption across ages and genders. This study may also provide new insights for e-vendors to formulate strategies that will encourage users to make online purchases and that will develop and enlarge the marketers' customer bases.

Literature review

Facebook commerce (F-commerce)

Social media has radically transformed the methods e-vendors conduct business, providing an entirely new medium in which to interact with consumers. One of the most profound impacts this medium had on e-vendors methods is its capacity to limit barriers to the dissemination of information. The access to information and interactivity provided by social media has created a shift in the balance of power in the e-vendor - consumer relationship. Traditionally, there has been a knowledge gap that has separated e-vendors and consumers. Due to the ease with which social media provides ready access to information, this knowledge gap is narrowing. For consumers, social media has affected aspects of consumers' control. This medium enables consumers to generate information content by presenting their ideas, preferences, and decisions. Furthermore, the content can be distributed to others.

Besides creating realignment in the balance of power between e-vendors and consumers, social media has also acted as a catalyst for the development and implementation of innovative concepts for e-commerce. This new concept is commonly referred to as social commerce (s-commerce) (Huang & Benyoucef, 2013). Liang and Turban (2011) summarized three major attributes of s-commerce: social technologies, community interactions, and commercial activities. Thus, social commerce can be considered a subset of e-commerce that involves using social technologies to assist e-commerce transactions and activities (Yadav, de Valck, Hennig-Thurau, Hoffman, & Spann, 2013). In essence, s-commerce is a combination of commercial and social activities (Liang & Turban, 2011; Zhou, Zhang, & Zimmermann, 2013).

Facebook commerce (f-commerce) is a type of s-commerce. Hajli, Sims, Zadeh, & Richard (2017) implied that Facebook offers multiple means of Consumer to Consumer (C2C) and Business to Consumer (B2C) connections and enables the co-creation of content in various forms by both e-vendors and customers and, therefore, can enhance the shopping experience (Marsden, 2011).

E-vendors can create a Facebook page as an additional outlet to facilitate promotion and sales opportunities by uploading pictures, videos, news, and promotions, which in turn strengthens the synergetic link between e-vendors and consumers. The consumers can co-create that page by commenting on, rating, reacting to, and sharing pictures, videos, and news on that page (Hajli et al, 2017). Furthermore, the page can be a platform for interaction with the e-vendor and other consumers.

Although Facebook has a huge potential for the creation of economic value, there is still a lack of studies regarding this subject and the results of the limited number of currently available have been disappointing (Yadav et al., 2013). For instance, Facebook's failed attempt to link consumers' browsing behavior on third-party Web sites to the ads they would view on Facebook (Yadav et al., 2013) was an ill-fated advertising platform launched in the fall of 2009 which resulted in a class-action lawsuit charging the company with violating consumers' privacy Vascellaro, 2009, as cited in Yadav et al., 2013) and unsuccessful online "F-commerce" storefronts which have been created by

well-known retailers through Facebook (Yadav et al. 2013). Despite this, some retailers have begun selling products using Facebook pages, probably because it is an inexpensive and easy method to try out social commerce. Using Facebook pages, consumers can share product information, interact with other users, and purchase the products from inside a retailer's Facebook page or Facebook news feed.

Unified theory of acceptance and use of technology 2 (UTAUT2)

Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) was developed through a review of the prior Unified Theory of Acceptance and Use of Technology (UTAUT) model. Even though UTAUT provided a very good, detailed model for the acceptance and use of technology, it has some limitations (Negahban & Chung, 2014). The UTAUT2 model improved the percentage of variance explained in the intention to use ICT by 18%, and in the actual use of ICT by 12% from the previous UTAUT (Venkatesh et al., 2012).

Whereas UTAUT was developed for an organization centered context, UTAUT2 was developed for consumer centered contexts. The UATUT2 model proposed four constructs from the original UTAUT; namely (i) performance expectancy, (ii) effort expectancy, (iii) social influence, and (iv) facilitating conditions. Three new constructs were also introduced; (i) hedonic motivation, due to its inclusion as a key predictor in much earlier research and its reported importance (Venkatesh et al., 2003), (ii) price, because in a consumer context users must bear the costs associated with the service use, and (iii) habit, supported by previous studies that showed it to be a critical factor in the technology use context (Kim and Malhotra, 2005; Limayem, Hirt & Cheung, 2007).

While performance expectancy is the most important factor for explaining employees' intention in the UTAUT model, in the UTAUT2 model the construct of hedonic motivation, which is more significant in explaining the intention to use ICT, was added to adapt it to the consumer use context. In addition, three moderators (i.e., age, gender and experience) were found to affect the relationships between the exogenous constructs and consumers' behavioral intention and actual usage (Venkatesh et al., 2012).

Trust and risk

Previous studies (Chiu, Huang, & Hui, 2010; Kim, Xu, & Gupta, 2012) have confirmed the positive link between trust and online purchase behavior intention in the e-commerce setting. Due to uncertainty caused by the high level of user-generated content and the lack of face-to-face interactions, trust is also a critical factor in s-commerce platforms (Featherman & Hajli, 2015).

Despite its importance being widely accepted, there is lack of agreement among scholars on the definition and conceptualization of trust. Hajli et al. (2017) claimed that in the s-commerce context, trust is a significant issue and it plays a particularly critical role in increasing purchase intentions. Social

media, such as Facebook, bridges the gap between consumers and e-vendors as a social commerce platform and provides amenities for the value exchange between parties. Through social media, customers can create and share content (i.e. advertisements, pictures/videos/news, and recommendations) and activities related to the e-vendors. The credibility of the contents and those activities depend on the trust in the social commerce platform.

The absence of face-to-face interactions could also further amplify the undesirable effect of perceived risk in the transaction (Kaiser & Müller-Seitz, 2008, as cited in Hajli et al., 2107). Perceived risk consists of the amount at stake (consequences) and subjective uncertainty of success that a consumer perceives in a situation (Jahankhani, 2009). It is a critical factor that influences whether the consumer will continue their online purchasing (Kim, Ferrin, & Rao, 2008)). The consequences for online purchases include economic, physical, and psychological stakes, etc. The high level of perceived risk associated with an online purchase can discourage an individual from completing an online purchase. In a situation where the consumers continue with the online purchase despite a high level perceived risk, they will engage risk-reducing behaviors to reduce the potential consequences (e.g. comparison shopping, trying a product sample, or purchasing insurance) or uncertainty (e.g. seeking more information from the past experiences of others) (Jahankhani, 2009).

Age and gender differences in technology adoption and its use

Although age, gender, and user experience have been studied as moderators in UTAUT and UTAUT2, recent studies (Khechine, Lakhal, Pascot, & Bytha, 2014; Lian and Yen, 2014) have claimed that age is the most important moderator in technology adoption, rather than gender or user experience. Age, also one of the most important variables in understanding user behavior in computer-mediated communication platforms (Dhir, Chen, & Nieminen, 2016; Haferkamp, Eimler, Papadakis & Kruck, 2012), influences the individual's attitudes toward, perceptions of, and their patterns of technology use (Dir & Torsheim, 2016; Khechine et al., 2014; Lian and Yen, 2014; Magsamen-Conrad, Upadhyaya, Joa & Dowd, 2015).

Previous studies have found that young people primarily view technology as a useful tool for entertainment, especially spending time on social networking sites and downloading songs (Volkom, Stapley, & Malter, 2013), while older people are involved in more serious Internet use, such as emailing, online shopping, and information seeking related to work and health (Jones & Fox, 2009, as cited in Dhir & Torsheim, 2016)

In the context of our study, we studied the differences between young adults and working adults. Young adults are people aged between 18 to 24 years old. Most of them are single, still study in university, or its equivalent, and, if they are already working, do not have a lot of working experience. On the contrary, working adults are people aged between 25 to 32

years, mostly working full time, have a regular income, and a larger disposable income compared to young adults. Majority of working adults are also married, although, they may or may not have small children.

Other than age, gender has also been found to be a critical moderator for understanding user behavior. According to Cyr (2014), there is a need for gender-related research in the context of the internet due to the use of the internet by males and females alike. By recognizing the importance of gender differences, e-vendors could be able to employ marketing strategies optimized to encourage online purchases for each gender. Previous scholars (Huang and Yang, 2010) have claimed that female consumers are more likely to focus on hedonic value, while male consumers are more likely to focus on utilitarian value in the e-commerce context. Furthermore, Davis et al. (2014) suggested that online purchase intention for male shoppers is higher than for females. However, there are still limited studies which have focused on the moderating effect of gender in the online shopping context (Cyr and Head, 2013; Shaoufe, Lü & Li, 2016), particularly in the setting of a developing country.

Research model and hypothesis

UTAUT2

Venkatesh et al. (2012) defined performance expectancy as a consumer's belief about the extent to which information system facilitates the completion of a task. In UTAUT and UTAUT2, performance expectancy has been found to positively affect consumers' intention to adopt a technology. Purchasing online through Facebook allows consumers' access from anywhere, 24 hours a day, 7 days a week, so it provides great benefit and convenience to consumers making a purchase. Thus, it is expected that individuals who perceived online purchasing through Facebook to have higher performance expectancy would be more intent to adopt that behavior.

H_1: Performance expectancy (PE) is positively related to a user's behavioral intention (BI) to purchase product through Facebook.

Effort expectancy refers to a consumer's perception of effort needed to complete a task using a given IS (Venkatesh et al., 2012). In UTAUT and UTAUT2, the researchers found that effort expectancy positively affects consumers' intention to adopt a technology. For this study, I assumed that when consumers felt that online purchasing through Facebook was easy and did not require much effort, they would be encouraged to adopt this behavior.

H_2: Effort expectancy (EE) is positively related to a user's behavioral intention (BI) to purchase a product through Facebook.

Facilitating conditions refers to consumers' perceptions of the resources and support available to perform a behavior (Venkatesh et al., 2012). It was assumed that if an operational infrastructure existed and supported the online purchasing through Facebook, it would increase the behavioral intention to adopt.

H_3: Facilitating conditions (FC) are positively related to a user's behavioral intention (BI) to purchase a product through Facebook.

Social influence signifies the influence of environmental factors, such as the opinions of a consumer's friends, relatives, and seniors, on behavior (Venkatesh et al., 2012). Therefore, positive opinions were expected to encourage the consumer to adopt online purchase behavior intention through Facebook.

H_4: Social Influence (SI) is positively related to a user's behavioral intention (BI) to purchase product through Facebook.

While the original UTAUT focused on extrinsic motivation (i.e., utilitarian value), UTAUT2 considers both extrinsic motivation and intrinsic motivation (i.e., hedonic motivation). In the UTAUT2 study, hedonic motivation was found to be an important determinant of technology adoption and use. Hedonic motivation represents the consumer's belief about the extent that using an IS is entertaining (Venkatesh et al., 2012). Compared to the other technologies that have been studied using UTAUT and UTAUT2, social media can be considered as an extremely hedonic technology and therefore, purchasing product through Facebook was expected to be enjoyable to users and leads to its adoption.

H_5: Hedonic motivation (HM) is positively related to a user's behavioral intention (BI) to purchase a product through Facebook.

Habit refers to the extent to which consumers' tend to perform automatic behaviors due to learning (Venkatesh et al., 2012). According to Limayem et al. (2007), habit has a moderate effect on intention since as habit increases, intention to use technology is less important. However, I assumed as a habit became engrained in a behavior, users were less likely to be attracted to the incentives and advantages alternatives offer and, as a result, habit might directly impact an individuals' intention. It is expected that the more the individual used Facebook to purchase products successfully, the more likely that Facebook, rather than other mediums, would be used to purchase the next product. Based on the above, this hypothesis is:

H_6: Habit (HT) is positively related to a user's behavioral intention (BI) to purchase product through Facebook.

Venkatesh et al. (2012) suggested that price value is one of the key determinants of intention. However, this construct would be irrelevant because anybody can use Facebook for free. Therefore, the concept of price value was removed from the core model and trust and risk were substituted.

Trust and risk

In this study, trust refers to the belief that "one can rely upon a promise made by another and that the other, in unforeseen circumstances, will act toward oneself with goodwill and in a benign fashion" (Suh & Han, 2003, p. 137). Past studies (Hajli et al., 2017; Wang, Min & Han, 2016) have suggested trust in a commerce platform was a key indicator of behavior intention. Thus, it is expected that only individuals who perceived

Facebook as a trusted entity would be inclined to purchase products through it.

On the other hand, perceived risk is a commonly recognized deterrent to ecommerce adoption. Perceived risk is defined as "a consumer's belief about the potential negative outcomes from the online transaction" (Kim et al, 2008, p. 546). We could safely conclude that when the consumers perceived that purchasing products through Facebook was risky, the less likely they would develop that behavior. As given, the following hypotheses were developed.

H_7: A consumer's trust (TR) in Facebook is positively related to the user's behavioral intention (BI) to purchase product through Facebook.

H_8: A consumer's perceived risk (RISK) in Facebook is positively related to the user's behavioral intention (BI) to purchase product through Facebook.

Age and gender as moderators

As previously stated, different age and gender groups have different paradigms of thinking and behavior. Furthermore, prior studies (Venkatesh et al., 2012, Khechine et al., 2014; Lian & Yen, 2014; Magsamen-Conrad et al., 2015) have confirmed that some aspects of consumer acceptance and use of information technology are heavily influenced by age and gender differences. In reference to my study, I was interested in understanding if my findings in this study were different either between young adults and working adults or between males and females. To confirm such insights, the last two hypotheses of this research were developed to test the categorical moderating effect of age (i.e., young adults vs. working adults) and gender (i.e., females vs. males). Thus, the following hypotheses:

H9: There is a significant categorical moderating effect by age on the relationship among the model constructs.

H10: There is a significant categorical moderating effect by gender on the relationship among the model constructs.

Based on this information, the conceptual framework for this study is shown in Figure 1.

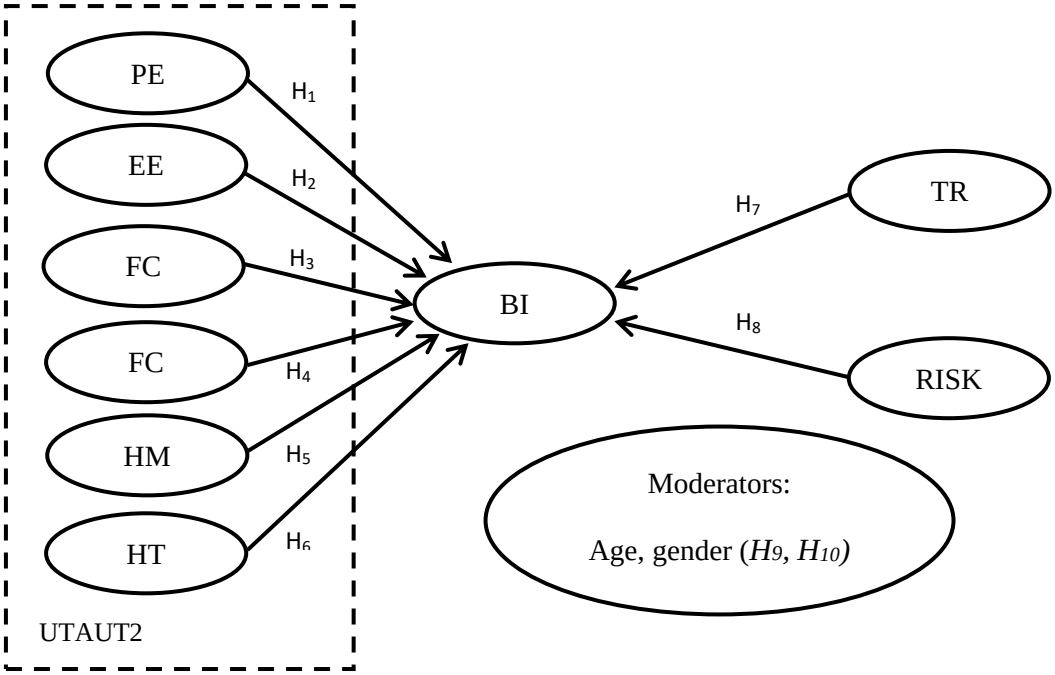


Figure 1 Conceptual framework

Research methodology

Measurement

To test the hypothesized relationships among variables in the proposed research model, a survey was conducted in Thailand. A questionnaire was developed for the survey using the constructs and items from the literature (Appendix A). Measurement items for performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, and behavioral intention were adapted from Venkatesh et al. (2012); items for trust and behavior intention were adapted from Gefen (2000) and Jarvenpaa et al (2000); and items for perceived risk were adapted from Jarvenpaa et al (2000) and Kohli (1989). Each item was measured on a five-point Likert scale, ranging from 1 (totally disagree) to 5 (totally agree). The questionnaire was created and administrated in English, and reviewed for content validity by language experts from a university. Because the questionnaire was administered in Thailand, the English version of the instrument was translated into Thai language. The questionnaire was then reverse translated into English to confirm translation equivalence.

Sample and procedure

I was able to collect four hundreds and ninety four (494) sets of responses after removing outliers and incomplete

responses. The respondents' ages ranged from 18 to 32. Using G*Power3.1.9.2 software with an effect size of 0.15, a confidence interval of 0.05, and a confidence power of 0.95, minimum sample size is 160. Thus, the sample size is considered appropriate for all groups (all, males, females, young adults and working adults). Sample characteristics are presented in Table 1.

I utilized a network and quota sampling techniques to collect data. Undergraduate students recruited survey participants from their social networks, with survey distribution targeted across a portion of the target population using an online questionnaire created using Google Docs. All participants gave informed consent before completing the survey and the survey took less than 15 minutes.

Table 1 Profile of respondents in this survey

Characteristics	Number (persons)	Percentage
Age		
18-24 years	246	49.8
25-32 years	248	51.2
Gender		
• Male	174	35.22
• Female	320	64.78
Marital status		
• Single	327	66.2
• Married without children	89	18
• Married with children	76	15.4
Educational level		
• High school (M4-M5)	67	13.6
• College/Vocational school or equivalent	82	16.6
• Bachelor degree	300	60.7
• Master degree or higher	40	8.1
Occupation		
• Government officer	62	8.6
• Staff/Management in private company	89	13
• Business owner	112	14.5
• Student	221	62.4
• Others	7	0.9
Personal income (Baht / month)		
• Not more than 10,000 baht	249	54.7
• 10,001-20,000 baht	173	38
• 20,001-30,000 baht	29	6.4
• 30,001-40,000 baht	1	0.2
• More than 40,001 baht	1	0.2
Regions of Thailand		
• Southern Thailand	179	39.3
• Northeastern Thailand	34	7.5
• Central Thailand	47	10.3
• Northern Thailand	195	42.9

Data analysis and results

The model used in this study is a combination of UTAUT2, trust, and risk. According to Hair, Hult, Ringle & Sarstedt (2014), in situations where the objective of the study is prediction of key constructs in an extended theory, rather than a theory confirmation, Partial Least Square Structural Equation Modeling (PLS-SEM) should be used instead of covariance-based SEM (CB-SEM). As stated above, SmartPLS 3.2.6 (Ringle, Wende, Becker, 2015) was used to perform PLS-SEM in this study.

Measurement model assessment

First, the measurement model was assessed for its reliability and validity. Given that reliability is a requirement for validity, indicator reliability of the model was first assessed to confirm whether the associated indicators had much in common with a particular latent construct. The reliability was assessed with three indices: Factor Loadings, Cronbach's Alpha values, and Composite Reliability, as shown in Table 2. All of the indicators were retained because their outer loadings were higher than 0.7082, meaning the latent variable should be able to explain at least 50% of each indicator's variance. Furthermore, all Cronbach's alpha values exceeded 0.7. In social science domains, it is generally understood that Cronbach's alpha values exceeding 0.7 are good.

The composite reliability for the constructs PE, EE, FC, SI, HM, TR, RISK and BI were shown to be 0.842, 0.873, 0.877, 0.870, 0.875, 0.887, 0.861, 0.874, and 0.879 respectively, indicating high levels of internal consistency reliability (Nunnally & Bernstein, 1994). It was well above the required minimum level of 0.60 that is required to reach a satisfactory composite reliability in exploratory research (Bagozzi and Yi, 1988) but did not exceed the 0.95 level (Hair et al., 2014).

Table 2 Reliability analysis

Construct	Items	Loading	Cronbach's Alpha	CR	AVE
PE	PE1	0.776	0.750	0.842	0.571
	PE2	0.738			
	PE3	0.762			
	PE4	0.747			
EE	EE1	0.835	0.806	0.873	0.632
	EE2	0.746			
	EE3	0.826			
	EE4	0.769			
FC	FC1	0.834	0.791	0.877	0.705
	FC2	0.861			
	FC3	0.823			
SI	SI1	0.819	0.776	0.870	0.690
	SI2	0.836			
	SI3	0.837			
HM	HM1	0.835	0.785	0.875	0.700
	HM2	0.862			
	HM3	0.813			
HT	HT1	0.84	0.809	0.887	0.724
	HT2	0.877			
	HT3	0.834			
TR	TR1	0.81	0.758	0.861	0.674
	TR2	0.848			
	TR3	0.805			
RISK	RISK1	0.858	0.715	0.874	0.777
	RISK2	0.904			
BI	BI1	0.851	0.794	0.879	0.708
	BI2	0.827			
	BI3	0.845			

Validity was assessed using convergent validity and discriminant validity. According to Fornell and Larcker (1981), the Average Variance Extracted (AVE) can be used to assess convergent validity. The AVE for the latent constructs PE, EE, FC, SI, HM, HT, TR, RISK and BI were 0.571, 0.632, 0.705, 0.690, 0.700, 0.724, 0.674, 0.777 and 0.708 respectively, exceeding the threshold level of 0.50 (Bagozzi and Yi, 1988). Thus, the measures of all the reflective constructs could be inferred to have high levels of convergent validity.

The discriminant validity was assessed using Fornell and Larcker's (1981) approach and cross loading examination. Based on Fornell and Larcker's (1981) method, Table 3 clearly shows that discriminant validity is met for this research because the square root of the AVE for PE, EE, FC, HM, HT, TR, RISK and BI were much larger than the corresponding latent variable correlations. Examining the cross loading in the Table 4, we also can see that the indicator's loading to its latent construct is higher than that of other constructs.

Table 3 Discriminant validity assessment

	PE	**EE**	**FC**	**SI**	**HM**	**HT**	**TR**	**RISK**	**BI**
PE	**0.756**								
EE	0.675	**0.795**							
FC	0.712	0.599	**0.839**						
SI	0.663	0.563	0.659	**0.831**					
HM	0.607	0.441	0.631	0.623	**0.837**				
HT	0.552	0.352	0.654	0.592	0.662	**0.851**			
TR	0.421	0.452	0.399	0.387	0.348	0.353	**0.821**		
RISK	-0.247	-0.305	-0.21	-0.324	-0.203	-0.253	-0.334	**0.881**	
BI	0.46	0.397	0.423	0.415	0.409	0.407	0.667	-0.323	**0.841**

Table 4 Cross loading

	PE	EE	FC	SI	HM	HT	TR	RISK	BI
PE1	**0.776**	0.523	0.473	0.516	0.461	0.343	0.304	-0.199	0.333
PE2	**0.738**	0.524	0.484	0.474	0.393	0.28	0.321	-0.122	0.346
PE3	**0.762**	0.488	0.59	0.537	0.485	0.516	0.321	-0.179	0.357
PE4	**0.747**	0.505	0.599	0.477	0.494	0.521	0.327	-0.245	0.352
EE1	0.539	**0.835**	0.545	0.446	0.378	0.324	0.357	-0.27	0.34
EE2	0.442	**0.746**	0.456	0.404	0.256	0.28	0.327	-0.214	0.246
EE3	0.565	**0.826**	0.438	0.387	0.343	0.242	0.346	-0.259	0.341
EE4	0.583	**0.769**	0.466	0.555	0.407	0.276	0.406	-0.22	0.321
FC1	0.635	0.582	**0.834**	0.55	0.513	0.503	0.358	-0.217	0.377
FC2	0.572	0.454	**0.861**	0.523	0.475	0.527	0.33	-0.177	0.347
FC3	0.58	0.463	**0.823**	0.588	0.603	0.622	0.313	-0.129	0.337
SI1	0.526	0.428	0.533	**0.819**	0.501	0.474	0.284	-0.261	0.333
SI2	0.544	0.441	0.507	**0.836**	0.525	0.486	0.339	-0.297	0.367
SI3	0.584	0.538	0.609	**0.837**	0.525	0.516	0.339	-0.248	0.334
HM1	0.535	0.388	0.611	0.533	**0.835**	0.583	0.283	-0.128	0.335
HM2	0.56	0.398	0.554	0.563	**0.862**	0.522	0.283	-0.189	0.346
HM3	0.429	0.321	0.419	0.468	**0.813**	0.556	0.307	-0.191	0.345
HT1	0.45	0.296	0.599	0.505	0.58	**0.84**	0.298	-0.172	0.377
HT2	0.453	0.268	0.524	0.492	0.543	**0.877**	0.278	-0.21	0.322
HT3	0.506	0.332	0.536	0.511	0.562	**0.834**	0.323	-0.268	0.334
TR1	0.366	0.399	0.367	0.336	0.306	0.3	**0.81**	-0.213	0.607
TR2	0.306	0.334	0.295	0.274	0.274	0.284	**0.848**	-0.323	0.497
TR3	0.362	0.377	0.317	0.339	0.276	0.284	**0.805**	-0.291	0.533
RISK1	-0.211	-0.261	-0.181	-0.271	-0.191	-0.221	-0.258	**0.858**	-0.265
RISK2	-0.223	-0.276	-0.189	-0.3	-0.169	-0.225	-0.326	**0.904**	-0.302
BI1	0.419	0.356	0.379	0.384	0.327	0.299	0.574	-0.245	**0.851**
BI2	0.317	0.308	0.311	0.293	0.321	0.364	0.544	-0.315	**0.827**
BI3	0.421	0.337	0.375	0.369	0.383	0.365	0.565	-0.258	**0.845**

Structural model assessment

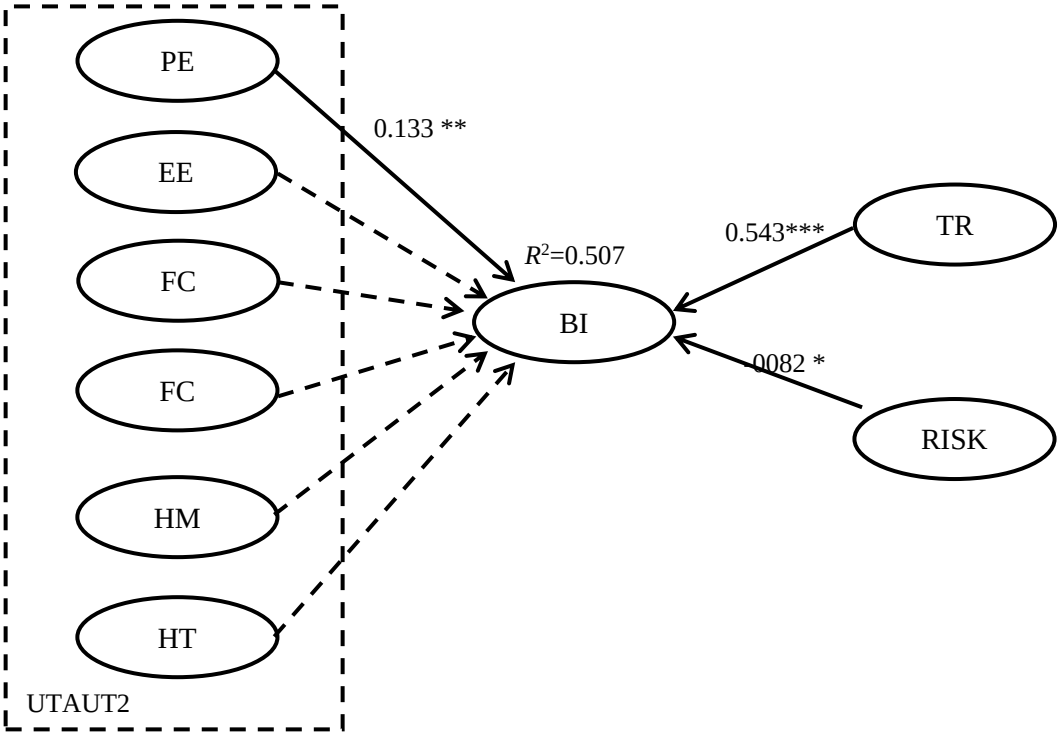
The structural model achieved R^2 value of 0.507 for behavioral intention. Hair at el., (2014) suggested a threshold value of 0.25, 0.5 and 0.7 are used to describe a weak, moderate, and strong coefficient of determination. In this study, the exogenous constructs explain more than 50% of the total variance of the endogenous construct, behavioral intention.

Hypotheses testing

Table 5 and Figure 2 show some of the relationships were significant, confirming our various hypotheses about the construct relationships. The structural model results enable us to conclude that TR has the strongest effect on BI (0.543), followed by PE (0.133) and RISK (-0.082).

Table 5 Significance testing results of the structural model path coefficients

Hypothesis	Path	Path Coefficients	TDEV	t-Value	p-Value	Result	R^2	f^{22}
H_1	PE -> BI	0.133	.054	2.464	0.007	Supported	0.507	0.012
H_2	EE -> BI	-0.038	.055	0.692	0.245	Not supported		0.001
H_3	FC -> BI	0.015	.060	0.249	0.402	Not supported		0.000
H_4	SI -> BI	0.015	.055	0.280	0.390	Not supported		0.000
H_5	HM -> BI	0.077	.054	1.439	0.075	Not supported		0.005
H_6	HT -> BI	0.064	.053	1.228	0.110	Not supported		0.004
H_7	TR -> BI	0.543	.039	13.947	0.000	Supported		0.426
H_8	RISK -> BI	-0.082	.040	2.055	0.020	Supported		0.011



Note: p<.10; **p<.05 ***p<0.01 NS=not significant*

Figure 2 Structural model analysis

Based on Cohen's (1988) guideline, which suggests that f^2 values of 0.02, 0.15, and 0.35 should be interpreted as small, medium, and large effect sizes, respectively, it can be said that only TR has a large f^2 effect size on BI. The other relationships have a small f^2 effect size on BI.

This study also assessed the effects of the categorical moderator of age and gender using a multi-group analysis (PLS-MGA) based on the parametric approach (Keil et al., 2000). As depicted in Table 6, only two relationships differed significantly across the two age groups and therefore, the ninth hypothesis (H_9) was rejected. Based on the findings, the effect of TR on BI were higher for young adults while the influence of PE on BI was greater in working adults. As shown in Table 7, H_{10} was also rejected as there are only two relationships differed significantly under the categorical moderator of gender. For female groups, the influence of FC on BI is more significant than in the male groups. On the other hand, the effect of HT on BI is greater in the male groups.

Table 6 Results of multi-group analysis (PLS-MGA) based on age

Hypothesis		Group 1: Young Adults		Group 2: Working adults		Group 1 vs. Group 2				Result
		$p^{(1)}$	$se(p^{(1)})$	$p^{(2)}$	$se(p^{(2)})$	$\lvert p^{(1)}-p^{(2)}\rvert$	t-Value	Significance Level	p-Value	
H_9	PE -> BI	0.054	0.094	0.367	0.067	0.313	2.764	*	0.006	Not Supported
	EE -> BI	0.129	0.107	-0.03	0.068	0.098	0.767	NS	0.443	
	FC -> BI	0.004	0.093	0.171	0.081	0.167	1.366	NS	0.173	
	SI -> BI	0.049	0.078	0.036	0.08	0.085	0.767	NS	0.443	
	HM-> BI	0.059	0.074	0.135	0.08	0.076	0.7	NS	0.484	
	HT -> BI	0.101	0.075	0.207	0.079	0.106	0.969	NS	0.333	
	RISK-> BI	0.016	0.055	0.046	0.056	0.062	0.788	NS	0.431	
	TR -> BI	0.589	0.052	0.071	0.07	0.518	5.978	*	0	
	n	246		248						

Note: p<.10; **p<.05 ***p<0.01; NS=not significant*

Table 7 Results of multi-group analysis (PLS-MGA) based on gender

Hypothesis		Group 1: Male		Group 2: Female		Group 1 vs. Group 2				Result
		$p^{(1)}$	$se(p^{(1)})$	$p^{(2)}$	$se(p^{(2)})$	$\lvert p^{(1)}-p^{(2)}\rvert$	t-Value	Significance Level	p-Value	
H_{10}	PE -> BI	0.208	0.084	0.087	0.07	0.122	1.078	NS	0.28	Not Supported
	EE -> BI	-0.031	0.082	-0.041	0.069	0.01	0.091	NS	0.928	
	FC -> BI	-0.184	0.097	0.13	0.073	0.314	2.581	**	0.01	
	SI -> BI	0.107	0.08	-0.02	0.069	0.127	1.134	NS	0.255	
	HM -> BI	0.042	0.097	0.093	0.062	0.051	0.459	NS	0.649	
	HT -> BI	0.184	0.086	-0.003	0.063	0.187	1.736	*	0.08	
	RISK-> BI	-0.037	0.067	-0.104	0.05	0.067	0.795	NS	0.42	
	TR -> BI	0.527	0.07	0.553	0.048	0.027	0.321	NS	0.747	
	n	174		320						

Note: p<.10; **p<.05 ***p<0.01 NS=not significant*

Discussion

Key findings

The results of this study offer several interesting insights into consumer behavior on f-commerce.

First, this study did not find that age is significant moderator; therefore, contradicting previous studies (Khechine et al., 2014; Lian & Yen, 2014; Magsamen-Conrad et al., 2015). A possible explanation for this is because the age difference between groups used in this study is quite close, thus, there may not be much of a significant difference to be found. It would be interesting to see whether the result would still be the same if the age difference was wider. Consistent with past studies (Khechine et. al., 2014; Lian & Yen, 2014; Magsamen-Conrad et al., 2015), I did not find evidence of gender being a significant moderator. Gender, as used in this study, was based on the reported biological sex like in previous studies, the suggestion by Magsamen-Conrad et al. (2015) to use attributes such as masculine/feminine orientations for classifying genders could be considered for future research.

One particularly notable finding that arose was a very significant relationship between trust in Facebook as a social commerce platform and behavior intention to purchase products through Facebook, which is supported by prior studies (Hajli et al., 2017; Lu et al., 2016). It suggests that respondents' trust in the platform itself could encourage respondents to purchase products through Facebook. There is no significant difference in the influence of trust across genders; however, its influence is more prominent in younger adults. Therefore, any business that plans to start s-commerce, particularly if targeting younger consumers, should select its social media carefully. If the brand of the chosen social media is famous and trustable, it will encourage consumers to purchase products through it.

Other than trust, the positive influence of performance expectancy on purchase behavior intention through Facebook among the respondents seems to suggest that that utilitarian attributes affect the adoption f-commerce. On the other hand, another psychological factor considered in the extended UTAUT2, hedonic motivation, did not affect the purchase intention. This means that respondents were more focused on the benefits that could help them to improve or complete their tasks, instead of the pleasure seeking benefits. This aspect is more prominent in working adults than young adults and occurred in both genders. It contradicts the previous study by Khechine et al. (2014), but is consistent with the previous study by Jones & Fox (2009) cited in Dhir & Torsheim (2016).

The findings also revealed that effort expectancy had no significant effect on the respondents' purchase behavior intention through Facebook. This supports the concept that consumers are ready to learn to use any system, regardless of it complexities, as long as it provides good performance in task completion. Another interesting fact is that since most respondents were between 18-32 years old, most of them were familiar with using computers and Facebook. Familiarity, by its nature, deals with complexity. Consumers who are familiar with Facebook will have a higher tendency to purchase through Facebook (Hajli et al., 2017) and

disregard the effort needed to complete the task.

Even though facilitating conditions did not have significant effects on respondents' behavior intention to purchase products through Facebook, supporting the prior study (Magsamen-Conrad et al, 2015), the construct had a greater influence among females than males. But, contradicting a study by Magsamen-Conrad et al (2015), there is no significant difference among different ages. Our previous suggestion to widen the age gap may be worth exploring.

Another interesting finding is that the presence of social influence did not affect consumer's intention to purchase products through Facebook. This is consistent with Venkatesh et al. (2003). In UTAUT, the researchers found that social influence positively affects consumers' behavioral intention to adopt a technology only in mandatory settings, whereas it did not affect the intention done in voluntary settings (Venkatesh et al, 2003). Therefore we should pay attention to the settings of online purchase behavior intention through Facebook, which is in voluntary, private, and personal settings. As the user's friends, relatives, and superiors, in most cases, cannot see whether the users are actually purchasing the items or not, their opinions will not influence the users' intention to purchase products through Facebook.

This study also provided evidence that perceived risk has significant influence on behavior intention, whereas a consumer's perceived risk reduces the consumers' intention to purchase through Facebook. There is no significant difference regarding the roles of perceived risk on behavior intention in any of the groups, suggesting that all respondents considered the negative outcome of transaction similarly (i.e., e-vendor will not fulfill its commitment or a loss after payment) before they decided on making an online purchase through Facebook. Actions can be taken by e-vendors to reduce the perceived risk through using a trustable social media with a good reputation or providing consumers with information about consumer rights or money-back guarantees.

Habit was not found to have a significant relationship with behavior intention, contradicting a prior study (Limayem et al., 2007). One possible explanation for this result is that, though users demonstrated habitual behaviors in purchasing product through Facebook, they can easily find some other channels (such as Instagram, Line, official website) with low switching costs and a low learning curve to do online transaction. Although insignificant with behavior intention, the influence of habit on behavior intention is stronger in males than females. Considering the operational definition, and by understanding and inventing ways to promote repetitive usage, companies would be able to attain more profits from this group.

Contributions of this study

From a theoretical perspective, this study contributes to the existing literature by providing evidence on the most influential psychological factors in the user's intention to adopt s-commerce, particularly f-commerce. Supported by an integrative well-known UTAUT2 academic model, this empirical results demonstrate, in line with other previous studies, that the intention to adopt f-

commerce is influenced by trust in social media, the performance expectancy and perceived risk. Additionally, in contrast to prior research on technology acceptance, it is demonstrated that intention is not affected by other constructs (i.e. effort expectancy, social influence, facilitating condition, habit and hedonic motivation) in UTAUT2. Finally, this research makes an important contribution by including age and gender and by demonstrating that these demographic factors do not play significant roles as moderator variables in the formation of f-commerce.

The knowledge of the psychological factors that explain the adoption of f-commerce is useful for e-vendors to redefine their strategies. It is important to highlight the need to inform the prospective consumers about the usefulness and instrumental advantages of purchasing product through Facebook. In this sense, e-vendors need to make an effort to communicate and to create advertising initiative in Facebook which can encourage consumers to purchase products through Facebook and reinforce the efficiency and effectiveness of this transaction channel. This would improve the performance expectancy of users with regard to f-commerce.

Moreover, as trust in social media is the most significant factor that influences the adoption of f-commerce, e-vendors must make an effort to understand and observe which social media that is trusted by their target market. The social media itself, as a s-commerce platform, must appeal to and credible to potential consumers in order to encourage their participation in s-commerce. In addition, their trust on the selected platform is expected to eliminate or reduce their perceived risk in s-commerce transaction.

Heterogeneity testing, using either age or gender, found that gender gap and age gap (particularly between young adults and working adults) are narrowing. Thus, there is no need for e-vendors to use the information on consumers' age or gender to create separate programs to drive customers towards f-commerce. However, online sellers must acknowledge that the degrees of influence of some factors are different among these groups and should be aware of these differences when designing marketing plans.

Limitations and future research

Our respondents were recruited through network sampling via Facebook, thus the sample collected cannot represent the entire Thai population. Therefore, caution needs to be taken when interpreting and generalizing the results.

It would also be worthwhile to include different age groups. For example, older consumers who may be less comfortable with online purchasing due to their lack of familiarity with computers and social media. For these consumers, effort expectancy will be a more significant factor than for younger, more experienced individuals. In the context of gender classification, attributes such as masculine/feminine orientations could be used instead of reported biological sex.

Additional constructs could also be added into the research model for the purpose of improving the prediction of behavior intention to purchase products through Facebook. These other constructs could include user experience with the Internet, social media, and with

online purchasing; user personality traits; and computer self-efficacy.

Finally, since s-commerce is a global phenomenon, it would be interesting to replicate this study in different countries and using other social media platforms, such as Instagram, YouTube etc., for comparative analysis.

Conclusions

The results reported in this study provide a preliminary understanding of consumer behavior in the adoption of f-commerce. I investigated the determinants for purchase behavior intention through Facebook using a framework adopted from the UTAUT2 model, trust, and risk. Regardless of its limitations, the study offers valuable theoretical and managerial insights. First, it shows the relevance of performance expectancy, trust in the s-commerce platform, and risk on purchase behavior intention. Secondly, it successfully examined the heterogeneity of the results using age and gender as the moderators. Trust in s-commerce platform turned out to have a stronger positive effect on purchase intentions than the other determinants, indicating that e-vendors' first priority should be to pay more attention to their selection of social media because a trustable social media platform itself can influence consumers to participate in f-commerce. In summary, the knowledge of consumers' behavior in f-commerce gained from this study will equip companies with a sustainable competitive advantage.

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Appendix Measurement items for constructs

Construct	Items	Adopted from
Performance Expectancy (PE)	PE1. Using Facebook is very useful in the purchasing process.	Venkatesh et al (2012)
	PE2. Using Facebook helps me to accomplish the purchasing process more quickly.	
	PE3. Using Facebook increases my efficiency in the purchasing process.	
	PE4. Using Facebook improves the performance in the purchasing process	
Effort Expectancy (EE)	EE1. Learning how to use Facebook to purchase products is easy for me.	Venkatesh et al. (2012)
	EE2. My interaction with Facebook to purchase products is clear and understandable.	
	EE3. I find Facebooks easy to use for purchasing products	
	EE4. It is easy for me to become skillful at using Facebook to purchase products.	
Facilitating Condition (FC)	FC1. I have the resources necessary to use Facebook for purchasing products	San Martín, H., & Herrero (2012), Venkatesh et al. (2012)
	FC2. I have the knowledge necessary to use Facebook for purchasing products	
	FC3. I feel comfortable using Facebook for purchasing products	
Social Influence (SI)	SI1. People who are important to me think that I should use Facebook to purchase products.	Venkatesh et al. (2012)
	SI2. People who influence my behavior think that I should use Facebook to purchase products	
	SI3. People whose opinions that I value prefer that I use Facebook to purchase products.	

Hedonic Motivation (HM)	HM1. Using Facebook to purchase products is fun.	Venkatesh et al. (2012)
	HM2. Using Facebook to purchase products is enjoyable.	
	HM3. Using Facebook products is very entertaining.	
Habit (HT)	HT1. The use of Facebook to purchase products has become a habit for me.	Venkatesh et al (2012)
	HT2. I am addicted to using Facebook to purchase products	
	HT3. I must use Facebook to purchase products	
Trust (TR)	TR1. Facebook is trustworthy.	Gefen (2000), Jarvenpaa et al (2000)
	TR2. Facebook gives the impression that it keeps promises and commitments.	
	TR3. I believe that this Facebook has my best interests in mind.	
Perceived risk (RISK)	RISK1. Purchasing from Facebook would involve more product risk (i.e. not working, defective product) when compared with more traditional ways of shopping	Jarvenpaa et al (2000), Kohli (1989)
	RISK2. How would you rate your overall perception of risk from this site?	
Purchase behavior intention through Facebook (BI)	BI1. I am likely to purchase products on Facebook.	Gefen (2000), Jarvenpaa et al (2000)
	BI2. I am likely to recommend Facebook to my friends.	
	BI3. I am likely to make another purchase from Facebook if I need the products that I will buy.	