
Continuance usage of mobile SMS: the moderating role of habit

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Abstract: With the rapid growth of mobile technology and social media, research into continuance usage of mobile social media services (MSMS) has emerged as an important issue. This study proposes a research model by extending the expectation-confirmation model with the perspectives of IS motivation theory, theory of planned behaviour, social cognitive theory and privacy concerns to explore the determinants of an individual's continuance intention and continuance usage toward MSMS. Data collected from 376 participants with prior experience with Facebook mobile were used to test the proposed model. The findings indicate that perceived usefulness and perceived enjoyment are important in forming the continuance intention and subsequently leading to continuance usage. The concern-for-information-privacy associated with secondary use, and anxiety associated with capability and contexts can be regarded as antecedents of users' continuance intention of using MSMS. Results also confirmed the moderating effects of habit on the relationship between users' continuous intention and usage.

Keywords: mobile anxiety; concern for information privacy; habit; perceived usefulness; perceived enjoyment; mobile social media services; MSMS.

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1 Introduction

Mobile phones have become one of the most influential technologies in people’s lives and have played an important role in daily communication for the past several years (Cheong and Park, 2005; Park and Chen, 2007; Pourrazav et al., 2014; Gong et al. 2018). The ubiquitous nature of mobile phones allows users to access the Internet and experience a rich variety of mobile services, such as games, searching, shopping, payment, banking, and instant messaging, anytime, anywhere. Among the proliferation of mobile services, mobile social media services (MSMS), which integrate user-generated contents with social networking features and mobile technologies, have undergone explosive growth and dramatically changed today’s communication paradigm.

Social media service is defined as “a group of internet-based applications that build on the ideological and technological foundations of Web 2.0 and allow the creation and exchange of user generated content” (Kaplan and Haenlein, 2010). Following this definition, MSMS refer to the use of social media applications on mobile devices. That is, MSMS provide an interactive platform in which all individuals can create, share, and exchange information to facilitate social interaction, collaboration, and content sharing with others via smartphones or tablet computers. Given the prevalence of various MSMS, MSMS providers face intense competition and low switching cost given that users can easily switch from one MSMS to another with just a few finger strokes. Therefore,

retaining existing users and building user loyalty are critical for the success of MSMS. A proper understanding of what factors influence and encourage MSMS users' continuance intention and usage can help MSMS providers develop sustainable MSMS that users are willing to reuse.

Extant studies have focused on examining the adoption of mobile commerce (e.g., Lu and Su, 2009; Chiang and Li, 2010), mobile advertising services (e.g., Mort and Drennan, 2007; Roach, 2009), mobile APP usage patterns (e.g., Tongaonkar et al., 2013; Xu et al., 2013), as well as the nature of mobile social APPs (e.g., Hsiao et al., 2016). However, the real-world behaviour of mobile service usage is a complicated phenomenon that is driven by several factors. In addition, prior studies have developed or embedded several theories [e.g., technology acceptance model (TAM), theory of reasoned action, theory of planned behaviour (TPB), expectation-confirmation model (ECM), and motivation theory] to construct research models and illustrate various aspects and related factors for the usage of mobile services. Although studies, (e.g., Khalifa and Shen, 2008; Maity, 2010; Liang and Yeh, 2011; Zhou, 2011, 2013; Kim, 2012) have incorporated these theories in mobile environment settings, few research models have applied them in the context of MSMS to develop a continuance usage prediction model. Therefore, this study attempted to integrate the perspectives of these theories to investigate the continuance usage of MSMS such that the understanding of the vision on the MSMS usage behaviour will be extended broadly and profoundly.

The ECM (Bhattacharjee, 2001) is considered one of the most well-known post adoption models that have been used to predict continuance usage behaviour in various contexts (Tam et al., 2018; Santos, 2018; Shang and Wu, 2017). Perceived usefulness, facilitating the utilitarian values of information system (IS), is confirmed as the primary factor that drives considerable influences on users' continuous intention. Given that MSMS is regarded as hedonic IS, the hedonic value of MSMS is important. Users can satisfy their needs for enjoyment through MSMS, such as feeling of self-presentation, sharing happy events, obtaining novel jokes, and browsing interesting pictures and videos. According to IS motivation theory, perceived enjoyment reflects an individual's belief that interaction with MSNS fulfils his or her intrinsic motivation. Thus, perceived enjoyment should be included as a critical factor motivating users to continue using MSMS. Perceived behavioural control, a salient determinant of behavioural intention in the TPB, captures and reflects the constraints and the perceptions of internal and external constraints on behaviour. The more resources and opportunities that individuals think they possess and the fewer obstacles they anticipate, the greater their perceived control over the behaviour and the greater their behavioural intentions. With the rapid explosion of the releases of a variety of MSMS with innovative functions, users may continue using the MSMS if they perceive ease for themselves to utilise their ability, resources or capability in successfully using the services. Within the MSMS context, few studies have examined the influence of perceived behavioural control on continuance intentions, and the extent of the relationship requires further research.

In addition, several studies (e.g., Agarwal and Karahanna, 2000; McFarland and Hamilton, 2006; Lu and Su, 2009; NDC, 2014) have identified anxiety as an important personality variable that influences the adoption and usage of information technology (IT) or IS. Based on social cognitive theory (Bandura, 1997), anxiety has a decisive role in the triadic reciprocity of behaviours, personal factors, and the environment. Certain individuals may avoid using computers due to anxiety (Heinssen et al., 1987). Lu and Su (2009) and Yang and Forney (2013) confirmed that technological anxiety affects user

intention toward online shopping. As such, the existence of anxiety on mobile technologies and the influence of anxiety on MSMS should be investigated.

Due to the fact that most MSMS possess rich information about user demographics, preferences, and social conversations, the risks of privacy have been raised as an important issue (Kim, 2018). Furthermore, MSMS have the distinguishing features of location- and time-sensitivity, which release the specific geographic and temporal information of users (Kaplan, 2012). The concerns for information privacy (CFIP) may alleviate the intention to continue using MSMS.

Lastly, what can stimulate an individual to perform certain activities repeatedly? People may browse their personal Facebook page and friends' posts every morning, watch YouTube video clips during lunch break or play games at leisure time via mobile devices. The frequent use of MSMS tends to become assimilated into part of life style and turn into regular and automatic usage without much conscious thinking, which facilitates the formation of habits (Hsiao et al., 2016). That is, as a habit has been built, the continuance usage may not be strongly influenced by conscious assessment (e.g., behavioural intention), but rather affected by habitual use (Limayem and Cheung, 2008; Hsiao et al., 2016). Previous research has generally agreed that habit plays an important role in IS or IT continued usage (e.g., Hsu et al., 2015; Limayem et al., 2007; Limayem and Cheung, 2008, 2011; Mouakket, 2015; Paul and Jacob, 2017). Limayem et al. (2007) stated that IS habit could moderate the influence of intention and its importance in determining behaviour decreases because behaviour adopts a habitual nature. Kim (2012) indicated that habit is a more prevalent predictor of actual use than conscious intention. Hsiao et al. (2016) further posited that habit has a significantly positive effect on continuance intention, and can be positively influenced by perceived usefulness, perceived enjoyment, and social ties. Although habit has been empirically analysed to clarify its influence on individuals' continuance intention and usage in various context, limited studies have been conducted on MSMS. Since understanding the role of habit advances our knowledge about the nature of habit in the MSMS context, the precise manner in which the moderating process (i.e., as an outcome of user habit) in MSMS operates should be recognised.

To address the aforementioned issues, the ECM is applied as a theoretical basis and extended by incorporating the perspectives of various theories, such as IS motivation, TPB, social cognitive theory, and privacy concern, to address the aforementioned issues. This study investigated perceived usefulness, enjoyment, and behavioural control, as well as CFIP and mobile anxiety. These antecedents are believed to influence the intention of an individual to continue using MSMS. Further, this study hypothesised that the habit as a moderator can help clarify the influence of continuance intentions on the usage of MSMS. The main contributions of this study are threefold. First, on the basis of the ECM, this study proposes a refinement model that incorporates multiple perspectives from previous studies and thoroughly examines the complicated phenomenon of MSMS usage. Second, taking the primary features of ubiquity and immediacy in MSMS, the proposed model differs from previous models by incorporating CFIP and mobile anxiety. Third, this work delineates and empirically evaluates the relationships among habit construct and mobile anxiety of users, continuance intention, and usage in the context of MSMS.

The rest of this paper is organised as follows. Section 2 presents the research model and hypotheses and illustrates theoretical support for relationships among the investigated constructs; Section 3 describes the research method; Section 4 presents the analysis of

results; Section 5 summarises the key findings and contributions as well as the theoretical and practical implications; and Section 6 deals with the concluding comments, limitations of this study, and future research directions.

2 Model development

In the IS discipline, the ECM posits that IS continuance intention is driven by perceived usefulness and satisfaction, which stand for the cognitive process and affective responses from prior experience of using IS. Later, Limayem et al. (2007) introduced the two constructs, namely, habit and IS continuance usage, into the ECM to form a new model. The extended ECM of Limayem et al. (2007) empirically tested the model, and the results supported that habit can act as a moderating variable of the relationship between intentions and IS continuance usage better than as a factor having a direct effect. Therefore, habit can play an important role between continuance intentions and usage. Many IS studies have followed Limayem et al. (2007) and focused on the moderating role of user habit in a variety of settings (Limayem and Cheung, 2011; Limayem and Hirt, 2003; Limayem et al., 2003; Kim and Malhotra, 2005; Kim et al., 2005; Limayem and Cheung, 2008; Kim, 2012). Consequently, this study applies the ECM of Limayem et al. (2007) as the theoretical basis to investigate the influences of critical constructs on the continuance intention and usage of MSMS. Given that this study profoundly focuses on the cognitive process of post adoption, perceived usefulness is adopted to explain the continuance intention. In addition, drawing on motivation theory, this study proposes perceived enjoyment as another important factor affecting continuance intentions. The proposed model identifies the following additional constructs as the key antecedents of the continuance intention of MSMS: perceived behavioural control, concern for information privacy, and mobile anxiety.

2.1 Antecedents of behavioural intentions

On the basis of studies on IS adoption (e.g., Davis et al., 1989; Venkatesh and Davis, 2000), perceived usefulness is constantly cited as the most important determinant of the adoption intentions of users. The ECM also posits that users' perceived usefulness of IT positively influences their intention toward continued usage (e.g., Bhattacharjee, 2001; Limayem et al., 2007). In addition, motivation can be distinguished into two types, namely, intrinsic and extrinsic, based on motivation theory. Although perceived usefulness in the TAM is an example of extrinsic motivation, perceived enjoyment can be depicted as an intrinsic motivation (Davis et al., 1992) to reflect the pleasure related to the use of IS. Users' perceived enjoyment can be a key belief that affects user continuance intentions because users may use MSMS for enjoyment rather than performance enhancement. Several studies pertaining to IS continuance have suggested that post-adoption expectations are represented by perceived usefulness and enjoyment, and IS users are intrinsically and extrinsically motivated (Thong et al., 2006; Kim et al., 2009; Kim, 2010). On the basis of these perspectives, the constructs of perceived usefulness and enjoyment to represent the antecedents of users' behavioural intentions are used in this study. Hence, we propose the following hypotheses:

Hypothesis 1 Perceived usefulness positively affects the MSMS continuance intention of users.

Hypothesis 2 Perceived enjoyment positively affects the MSMS continuance intention of users.

According to Ajzen (1991), perceived behavioural control plays an important part in TPB. Ajzen (2002) emphasised that the construct of perceived behavioural control is added to manage situations in which people may lack complete volitional control over behavioural interest. Given that perceived behavioural control can capture and reflect the constraints and the perceptions of internal and external constraints on behaviour, this study includes the construct ‘perceived behavioural control’ in the research model. Therefore, this work expects the same remarkable effect in the context of MSMS usage and posits the following hypothesis:

Hypothesis 3 Perceived behavioural control positively affects the MSMS continuance intention of users.

In a legal context, privacy is largely synonymous with ‘the right to be let alone’ (Warren and Brandeis, 1890) or ‘the right to be alone’ (Warren and Brandeis, 1984). Westin (1967) indicated that “Privacy is the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others”. Stone et al. (1983) referred to information privacy as the ability of an individual to control information about one’s self. Furthermore, prior studies have posited that privacy concerns often arise while IT or IS is implemented with enhancing capabilities for collection, storage, use, and communication of personal information (Clark, 1988; Culnan, 1993; DeSanctis, 1989; Henderson and Snyder, 1999; Mason, 1986; Milberg et al., 1995; Smith et al., 1996; Warren and Brandeis, 1890; Webster, 1998). Stewart and Segars (2002) posited that CFIP should behave as a predictor of behavioural intention. The higher the individuals’ level of CFIP, the more likely they will be to invoke the necessary measures to protect their privacy (Korzaan et al., 2009). Zhou and Li (2014) confirmed that privacy concern has significant effects on continuance usage. Hence, the following hypothesis is proposed:

Hypothesis 4 The CFIP of users is positively correlated with their MSMS continuance intentions.

Agarwal and Karahanna (2000) identified anxiety as an important personality variable that influences system use in IT/IS. The social cognitive theory of Bandura (1997) indicates that interactive relationships exist among anxiety, behaviour, personal factors, and the environment. Prior studies (e.g., Schlenker and Leary, 1982; Spielberger, 1972; Venkatesh and Davis, 2000) have stated that personal beliefs can mediate the relationship between anxiety and behaviour.

As mobile phone is a type of technology device and MSMS is a form of technology service used on mobile phones, anxiety on MSMS usage (hereinafter referred to as mobile anxiety) shares similar concepts related to technology, computer, and internet anxiety. This study refers to mobile anxiety as a feeling or emotion evoked by the use of mobile-enabled technologies or application programs. Specifically, mobile anxiety denotes “an uncomfortable feeling or emotional disposition, experienced in the mobile environmental settings, which has cognitive, affective, physiological, and behavioral ramifications”. Several studies have found that anxiety has a significant negative

influence on IT or IS adoption and usage (e.g., Compeau et al., 1999; McFarland and Hamilton, 2006; Lu and Su, 2009). Chiu and Wang (2008) empirically tested that anxiety is negatively related to web-based learning continuance intention. Taking account of the distinguished features of MSMS, such as ubiquity, convenience, immediacy, and shareability, incorporating anxiety in the current study based on social cognitive theory is important and interesting. Consistent with the purpose of evaluating the influence of mobile anxiety on MSMS continuance intention, this study proposes the following hypothesis:

Hypothesis 5 Mobile anxiety is negatively correlated to the MSMS continuance intentions of users.

Bhattacharjee (2001) developed the IS continuance model in line with expectation confirmation theory and uniquely relied on intention as the primary predictor of IS continuance usage behaviour. Furthermore, on the basis of previous studies (Oliver, 1993; Oliver and Desarbo, 1988), IS continuance intention can be viewed as a primary factor of IS actual usage (Idemudia et al., 2018). Behavioural intentions represent individual motivations in the sense of their conscious plans to exert effort in implementing behaviour (Eagly and Chaiken, 1993). Moreover, several studies on the IS and marketing domains have concluded that IS behaviour is guided by reasoned conscious intention toward a target IS (e.g., Hong et al., 2008; Kim et al., 2005; Thong et al., 2006). Kim (2012) indicated that continuance intention and habit have important roles in the actual use of mobile data services and applications. Continuance intentions toward individuals' MSMS may be significantly correlated to actual usage behaviour. Thus, we posit the following hypothesis:

Hypothesis 6 The continuance intentions of users are positively related to their MSMS continuance usage.

2.2 Habit

Habit is commonly understood as "learned sequences of acts that become automatic responses to specific situations, which may be functional in obtaining certain goals or end states" (Verplanken and Aarts, 1999). In IS discipline, habit is conceptualised as automatic behavioural tendencies that result from learning (Khalifa et al., 2001; Limayem et al., 2007). In this study, habit refers to the extent to which users tend to use MSMS automatically and regularly. Previous research revealed that habit is a major predictor of consumer behaviour (Chaudhuri, 1999; Tucker, 1964) and behavioural intentions in general (Ouellette and Wood, 1998; Trafimow, 2000; Trafimow and Borrie, 1999; Triandis, 1980). Habit and TAM complement each other, that is, TAM deals with a rational assessment, habit addresses its limitations (Gefen, 2003) and habitual behaviour induces a continuous behaviour of the same type (Aarts et al., 1998).

Prior studies have investigated the influences of habit on behaviour from different points of view. Habit can be as a direct effect or as an interactive effect. While some research has considered the direct influence of habit on continuance usage with additional explanation power (Limayem et al., 2007; Limayem and Cheung, 2011; Kim, 2012; Lee, 2014; Chen et al., 2015), others argued that actual behaviour is primarily driven by

intention, and the role of habit is thus acted as a predictor of intention (Khalifa et al., 2001; Khalifa and Liu, 2005, 2007; Liao et al., 2006; Cao and Yin, 2010; Kim, 2012; Hsiao et al., 2016). In contrast to the above research, some recent studies provided empirical support for the moderator-hypotheses. Habit was proposed to moderate the link between intention and continued usage (Limayem et al., 2007; Bhattacharjee and Barfar, 2011) or the relationships between behavioural intention and its antecedents, such as satisfaction, trust, perceived value (Khalifa and Liu, 2007; Chiu et al., 2012; Hsu et al., 2015; Paul and Jacob, 2017).

Nowadays, people are inclined to use MSMS daily and frequently to increase their knowledge, concentration, research abilities and social interaction. This situation becomes a routine and the habit on MSMS usage is formed over time. Therefore, this study takes the moderation perspective to explain that the predictive power of continuance intention is alleviated when the use of MSMS becomes habitual. We also investigate the moderating influence of habit between continuance intention and anxiety. The following hypotheses are proposed:

Hypothesis 7 The relationship between mobile anxiety and MSMS continuance intentions of actual users is moderated by their habit.

Hypothesis 8 The relationship between MSMS continuance intention and usage of users is moderated by their habit.

(Moderated mediation) combined Hypotheses 7 and 8: habit moderates the strength of the mediated relationship between the mobile anxiety and MSMS continuance usage of users through their continuance intentions. As such, the mediated relationship becomes stronger when the habitual tendency is high than when low. Figure 1 summarises the theoretical arguments.

Figure 1 Research framework

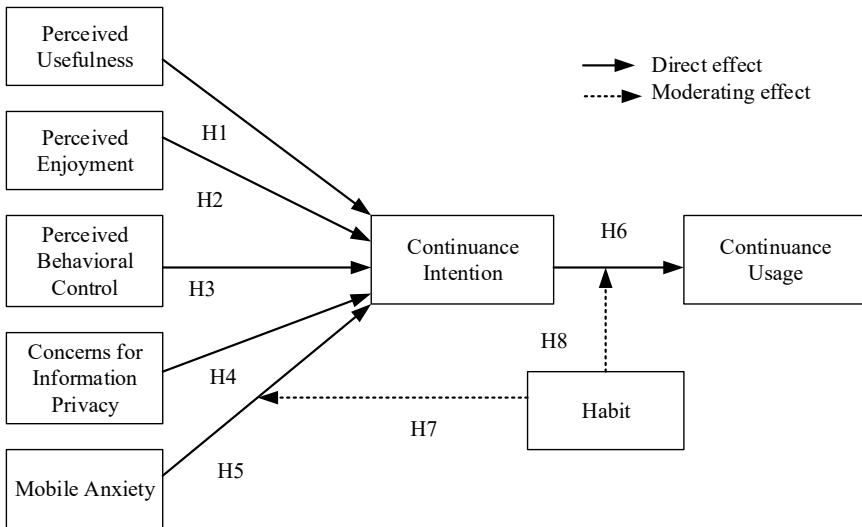


Table 1 Demographic information of the sample

<i>Demographics</i>	<i>Item</i>	<i>Frequency</i>	<i>Percentage (%)</i>
Gender	Male	194	51.6
	Female	182	48.4
Age	Less than 12	0	0
	12–14	1	0.3
	15–19	70	18.6
	20–29	156	41.5
	30–39	93	24.7
	40–49	43	11.4
	50–59	12	3.2
	60–64	1	0.3
	Over 65	0	0
Education	Elementary school	0	0
	Junior high school	7	1.9
	Senior high school	55	14.6
	College	227	60.4
	Master or above	87	23.1
Career	Manufacturing	20	5.3
	Business	36	9.6
	Education service industry	32	8.5
	Students	148	39.3
	Service industry	41	10.9
	Pharmaceutical service industry	8	2.1
	Professionals	27	7.2
	IT industry	9	2.4
	Government functionary	9	2.4
	Researchers	4	1.1
	Unemployed	6	1.6
	Mandatory service	3	0.8
	Housekeeper	9	2.4
	Others (or fill)	24	6.4
Facebook mobile experience (in years)	Less than 1 year	6	1.6
	2–3 years	59	15.7
	3–4 years	74	19.7
	More than 4 years	237	63.0

3 Research method

3.1 Sample and procedure

This study targets participants who have experiences with MSMS. Among the various MSMS supporting a wide range of interests and practices, Facebook mobile is considered one of the most popular social media platforms. Therefore, Facebook mobile could serve as an appropriate context of research. The information about this study was posted on Pixnet (an online Taiwanese mobile photo sharing, blogging, and social network service website), PTT (the largest terminal-based bulletin board systems in Taiwan), LINE, and Facebook to recruit research participants. The participants answered the questionnaires anonymously, and the questionnaires were subsequently collected. The data collection process involved two phases, namely, pilot study and formal questionnaire. On the basis of the results of the pilot study, a survey with refined questionnaire was administered to collect data. A total of 449 participants completed the questionnaire. The 376 participants who had prior experience with Facebook mobile were regarded as valid (83.7%). The survey population consisted of 194 males (51.6%) and 182 females (48.4%). The chi-square tests compared across the two groups revealed no significant differences between gender types ($\chi^2 = 0.541, p = 0.426 > 0.05$). To ensure the fit of samples, we compared the gender distribution of returned questionnaires to the population gender distribution and found no significant differences ($\chi^2 = 0.383; p = 0.536 > 0.05$). The mean age of the participants was approximately 28.7 years, ranging from 14 to 60 years. The respondents came from a variety of occupations including students, service industry, business, education, manufacturing, IT industry, public service, and others. Table 1 summarises the demographic information of the sample.

To address the concern for common method variance, we conducted the single factor procedure where all items were loaded to a single factor (Podsakoff and Organ, 1986). The results indicated that the one factor model did not fit well in our study (CFI = 0.811, RMSEA = 0.082), with details reported in Table 2. Thus, we contend that the method is unlikely to be a serious concern for this study.

Table 2 Common method variance test

<i>Model</i>	χ^2	<i>DF</i>	$\Delta\chi^2$	ΔDF	<i>P-value</i>
Single factor	3823.980	1077	1170.71	51	0.00
Multi-factor	2653.277	1026			

3.2 Measures

The scales used in this research have been validated in previous well-known studies, but wording was modified to suit the context of MSMS. If Chinese-translated scales were unavailable in the literature, then the scales were translated using back translation from English to Chinese and then reverse-translated into English. The translated scales were reviewed by two bilingual experts for content validity. All items were measured using five-point Likert scales, ranging from strongly disagree (1) to strongly agree (5), except that continuance usage was measured from 'never' to 'always' (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always). A series of pre-tests was conducted on a convenience sample of respondents to determine the validity of the measures.

Perceived usefulness construct was measured with six items adapted from Davis (1989), which were broadly adopted by previous studies in various research contexts. The first four items of perceived enjoyment construct were adapted from Davis et al. (1992), Sun and Zhang (2006), and Thong et al. (2006) to match the current context (i.e., continuance usage of Facebook mobile), while the last two items were adapted from Liao et al. (2008), which was sourced from Moon and Kim (2001) and van der Heijden (2004). The items of the perceived behavioural control were adapted from Mäntymäki et al. (2014).

Table 3 List of measures

<i>Construct</i>	<i>Item</i>	<i>Measurements</i>	<i>Sources</i>	
Perceived usefulness (U) ^a	U1	Using Facebook mobile in my life or job enables me to accomplish tasks more quickly.	Davis (1989)	
	U2	Using Facebook mobile in my life or job would improve my performance.		
	U3	Using Facebook mobile in my life or job would increase my productivity.		
	U4	Using Facebook mobile would enhance my effectiveness on my life or job		
	U5	Using Facebook mobile would make it easier to do my job.		
	U6	I find Facebook mobile useful in my life or job.		
Perceived enjoyment (E) ^a	E1	I find using Facebook mobile to be enjoyable.	Davis (1992), Thong et al., (2006) and Sun and Zhang (2006)	
	E2	The actual process of using Facebook mobile is pleasant.		
	E3	I have fun using Facebook mobile.		
	E4	I find using Facebook mobile to be interesting.		
	E5	Using Facebook mobile is a good way to spend my leisure time.		Liao et al., (2008), Moon and Kim (2001) and van der Heijden (2004)
	E6	Various services in Facebook mobile arouse my curiosity.		
Perceived behavioural control (PBC) ^a	BC1	I have the resources, knowledge and ability to use Facebook mobile.	Mäntymäki et al. (2014), Ajzen (1991) and Taylor and Todd (1995)	
	BC2	I can use Facebook mobile.		
	BC3	I know how to use Facebook mobile.		
	BC4	Using Facebook mobile is entirely within my control.		

Notes: ^a1–5 scale; 1 = strongly disagree; 5 = strongly agree

^b1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always

Table 3 List of measures (continued)

<i>Construct</i>	<i>Item</i>	<i>Measurements</i>	<i>Sources</i>
Mobile anxiety (AN) ^a	AN1	I am confident that I can learn Facebook mobile skills on a smartphone.	Meuter et al. (2003)
	AN2	I have difficulty understanding most Facebook mobile matters on a smartphone.	
	AN3	I feel apprehensive about using Facebook mobile on a smartphone.	
	AN4	When given the opportunity to use Facebook mobile on a smartphone, I fear that I might damage it in some way.	
	AN5	I am sure of my ability to interpret Facebook mobile output on a smartphone.	
	AN6	Facebook mobile terminologies on a smartphone sound confusing and jargon to me.	
	AN7	I have avoided Facebook mobile on a smartphone due to unfamiliarity.	
	AN8	I am able to keep up with important Facebook mobile advances on a smartphone.	
	AN9	I hesitate to use Facebook mobile on a smartphone for fear of making mistakes I cannot correct.	
		AN10	I fear that I might destroy information on a smartphone or mobile APP after incorrectly using Facebook mobile.
CFIP/collection (PC) ^a	PC1	It often bothers me when Facebook mobile asks me for personal information.	Smith et al., (1996), Stewart and Segars (2002) and Korzaan et al. (2009)
	PC2	When Facebook mobile asks me for personal information, I sometimes think twice before providing it.	
	PC3	It bothers me to provide personal information to many people.	
	PC4	I am concerned that Facebook mobile is collecting many personal information about me.	
CFIP/unauthorised access (PU) ^a	PU1	Facebook mobile should devote considerable time and effort to prevent unauthorised access to personal information.	
	PU2	Facebook mobile databases that contain personal information should be protected from unauthorised access – regardless of the costs.	
	PU3	Facebook mobile should take further steps to ensure that unauthorised people cannot access personal information in their computers.	

Notes: ^a1–5 scale; 1 = strongly disagree; 5 = strongly agree^b1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always

Table 3 List of measures (continued)

<i>Construct</i>	<i>Item</i>	<i>Measurements</i>	<i>Sources</i>
CFIP/errors (PE) ^a	PE1	All personal information in Facebook mobile databases should be double-checked for accuracy – regardless of the costs.	
	PE2	Facebook mobile should take further steps to ensure that personal information in their files is accurate.	
	PE3	Facebook mobile should have improved procedures to correct errors in personal information.	
	PE4	Mobile Facebook should devote considerable time and effort in verifying the accuracy of personal information in their databases.	
CFIP/secondary use (PS) ^a	PS1	Facebook mobile should not use personal information for any purpose unless authorised by individuals who provided the information.	
	PS2	When people provide personal information to a company for some reason, Facebook mobile should never use that information for any other purpose.	
	PS3	Facebook mobile should never sell personal information in their databases to other companies.	
	PS4	Facebook mobile should never share personal information with other applications unless authorised by individuals who provided the information.	
Habit (H) ^a	H1	Using Facebook mobile on a smartphone has become automatic to me.	Limayem et al. (2007) and Churchill (1979)
	H2	Using Facebook mobile on a smartphone is natural to me.	
	H3	Using Facebook mobile on a smartphone is an evident option for me when faced with a particular task.	
Continuance intention (CI) ^a	CI1	I intend to continue using Facebook mobile rather than any alternative web/win programs.	Bhattacharjee (2001) and Limayem et al. (2007)
	CI2	My intentions are to continue using the Facebook mobile rather than any alternative web/win programs.	
	CI3	If I could, I would like to continue my use of the Facebook mobile.	
Continuance usage (CU) ^b	CU1	In the last 7 days, how frequently did you use Facebook mobile on your smartphone?	Wu and Wang (2005)

Notes: ^a1–5 scale; 1 = strongly disagree; 5 = strongly agree

^b1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always

To search for an appropriate measure for mobile anxiety, prior anxiety measurements were thoroughly reviewed. Most existing scales were related to technology, computer, or

Internet anxieties. Meuter et al. (2003) developed the nine-item scale of technology anxiety to reflect the general anxiety in all forms of technology. Therefore, this study adapted measurements from Meuter et al. (2003) and adjusted to fit the context of MSMS. One more item, used by Thatcher and Perrew (2002) and derived from the computer anxiety rating scale (Heinssen et al., 1987), was added to measure mobile anxiety to be more comprehensive. CFIP was a second-order construct, including four dimensions, namely, collection, unauthorised access, errors, and secondary use. CFIP was measured by the items adapted from Smith et al. (1996), Stewart and Segars (2002), and Korzaan et al. (2009). The original scale was designed for organisational levels. However, this study, which focused on specific Internet-related levels, used the term 'Facebook mobile' as a substitute for 'companies'.

Three items measuring habit were adapted from Limayem et al. (2007), who developed the habit scale on the basis of Churchill's (1979) robust paradigm. Items to assess individuals' continuance intentions were adapted from Bhattacharjee (2001) and Limayem et al. (2007). Finally, continuance usage was measured by one item on the basis of Wu and Wang (2005). Table 3 presents the scale used in this study.

3.3 Data analyses

Exploratory factor analysis (EFA) and confirmation factor analysis (CFA) were performed because the perceived enjoyment and mobile anxiety scales were modified in this study. In EFA, all of the items were loaded into a single factor, and each factor had a loading of more than 0.5. This study followed the recommendations of Anderson and Gerbing (1988) and used maximum likelihood with LISREL to evaluate convergences and discriminate the validity of these constructs with CFA. In the CFA model, the relationships between each item and their respective variables were statistically significant at the 0.01 level, with all indicator loadings exceeding 0.5. The overall fit of the measurement model was good, and these indices remained within an acceptable range ($\chi^2 = 2,754.65$, $df = 1,123$, $\chi^2/df = 2.45$, NFI = 0.93, NNFI = 0.95, CFI = 0.96, IFI = 0.96, RMSEA = 0.062). Moreover, Cronbach's α value of all the constructs and subscales exceeded the threshold of 0.7, and the composite reliability (CR) value for all of the constructs exceeded the threshold of 0.6 (Fornell and Larcker, 1981). Table 4 summarises the item loadings and reliability.

Table 4 Psychometric table of measurements for standardised factor loading

<i>Construct</i>	<i>Subscale</i>	<i>Item</i>	<i>Loading</i>	<i>St. error</i>	<i>t-value</i>	<i>CR</i>	<i>AVE</i>	<i>Cronbach's α</i>
Construct perceived usefulness (U)	Subscale	U1	0.98	0.31	21.08	0.94	0.74	0.94
		U2	0.91	0.21	22.07			
		U3	0.89	0.34	19.82			
		U4	0.93	0.22	21.92			
		U5	0.97	0.25	21.82			
Perceived enjoyment (E)		U6	0.80	0.45	17.37	0.92	0.66	0.92
		E1	0.88	0.35	19.52			
		E2	0.87	0.19	22.13			
		E3	0.88	14.00	23.12			
		E4	0.88	0.17	22.62			
		E5	0.69	0.50	15.24			

Table 4 Psychometric table of measurements for standardised factor loading (continued)

<i>Construct</i>	<i>Subscale</i>	<i>Item</i>	<i>Loading</i>	<i>St. error</i>	<i>t-value</i>	<i>CR</i>	<i>AVE</i>	<i>Cronbach's α</i>
Perceived behavioural control (PBC)		E6	0.66	0.83	12.20	0.85	0.61	0.85
		BC1	0.56	0.50	12.76			
		BC2	0.72	0.19	19.90			
		BC3	0.72	0.12	21.69			
Concerns for information privacy (CFIP)	Collection (PC)	BC4	0.64	0.41	15.12	0.86	0.61	0.94
		PC1	0.61	0.44	14.27			
		PC2	0.58	0.32	15.40			
	Unauthorised access (PU)	PC3	0.77	0.18	20.56			
		PC4	0.73	0.22	19.35	0.92	0.78	
		PU1	0.67	0.15	20.87			
	Errors (PE)	PU2	0.63	0.09	22.18			
		PU3	0.68	0.12	21.62	0.93	0.78	
		PE1	0.71	0.18	20.50			
		PE2	0.80	0.14	22.40			
	Secondary use (PS)	PE3	0.76	0.15	21.73			
		PE4	0.81	0.22	20.75	0.92	0.74	
		PS1	0.63	0.17	19.74			
PS2		0.62	0.12	20.99				
PS3		0.63	0.11	21.37				
Mobile anxiety (N)	Mobile anxiety on capability(A)	PS4	0.63	0.17	19.58	0.79	0.56	0.88
		AN1	0.68	0.27	17.17			
	Mobile anxiety on contexts (B)	AN5	0.60	0.44	13.72			
		AN8	0.68	0.29	16.79	0.90	0.57	
		AN2	0.89	0.64	16.38			
		AN3	0.86	0.54	16.84			
		AN4	0.81	0.63	15.49			
		AN6	0.92	0.41	18.9			
		AN7	0.90	0.44	18.34			
		AN9	0.86	0.57	16.56			
Habit (H)		AN10	0.86	0.75	15.11	0.80	0.61	0.78
		H1	0.90	0.22	20.76			
		H2	0.75	0.16	20.62			
Continuance intention (CI)		H3	0.52	0.78	10.08	0.92	0.79	0.91
		CI1	0.96	0.14	23.51			
		CI2	0.99	0.08	24.8			
		CI3	0.71	0.36	17.26			

Table 5 Correlation between constructs

	U	E	PBC	PC	PU	PE	PS	NP	NC	H	GE	AG	ED	CU	CI
U	0.86														
E	0.62***	0.81													
PBC	0.38***	0.49***	0.78												
PC	0.03	0.09	0.28***	0.78											
PU	0.02	0.21***	0.30***	0.74***	0.89										
PE	0.09	0.18***	0.16**	0.50***	0.67***	0.88									
PS	-0.02	0.14**	0.34***	0.60***	0.86***	0.66***	0.86								
NP	-0.21***	-0.24***	-0.72***	-0.32***	-0.42***	-0.28***	-0.49***	0.75							
NC	0.13*	0.04	-0.32***	-0.03	-0.17**	-0.06	-0.21***	0.40***	0.76						
H	0.42***	0.58***	0.51***	0.16**	0.26***	0.23***	0.27***	-0.53***	-0.15*	0.79					
GE	-0.04	-0.02	0.00	0.06	0.06	0.05	0.08	0.13*	-0.03	-0.03	1				
AG	-0.09	-0.10*	-0.24***	0.00	-0.02	0.04	-0.01	0.21***	0.10*	-0.09	0.05	1			
ED	0.00	-0.01	0.14**	0.02	-0.04	-0.07	-0.01	-0.12*	-0.29***	0.07	0.04	0.20***	1		
CU	0.37***	0.43***	0.23***	0.00	0.06	0.05	0.07	-0.15**	0.00	0.52***	0.12*	0.04	0.07	1	
CI	0.43***	0.48***	0.24***	-0.01	0.06	0.11*	0.08	-0.18**	0.15**	0.55***	-0.18**	0.01	0.03	0.53***	0.89

Notes: PS1: diagonal elements are square roots of the average variance extracted

PS2: GE: gender; AG: age; ED: education

3.4 Convergent validity and discriminant validity

The average variance extracted (AVE) across the constructs exceeded the 0.5 benchmark, as recommended by Fornell and Larcker (1981). The results suggested that the measurement had adequate item reliability and CR. Table 5 shows that each construct shared a larger variance with its block of measures than with the other constructs representing a different block of measures. Moreover, the 95% confidence intervals of all inter-factor correlations were not over 1.00, demonstrating satisfactory discriminant validity (Hair et al., 2006). Overall, these results provided strong empirical support that the measurement had an adequate level of convergent and discriminant validity. Given that the measurement had sufficient reliability and validity, this study could proceed to testing the proposed model against the data.

4 Results

Table 6 presents the descriptive statistics of the variables in this research.

Table 6 Descriptive statistics of construct variables

<i>Construct</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. deviation</i>
U	6.00	30.00	18.14	5.64
E	6.00	30.00	20.81	5.08
PBC	5.00	20.00	15.35	2.85
PC	6.00	20.00	17.16	2.91
PU	5.00	15.00	13.56	2.07
PE	4.00	20.00	17.15	3.20
PS	8.00	20.00	18.07	2.63
NP	3.00	13.00	6.60	2.21
NC	7.00	35.00	17.68	6.42
H	3.00	15.00	11.24	2.41
CI	3.00	15.00	10.42	2.75
CU	1	5	3.87	0.98

Note: N = 376

4.1 Hypotheses testing

This study followed a hierarchical process in testing the proposed research model. Hierarchical linear regression (HLR) analysis was performed using SPSS 25.0, in which this study compared the results of three situations, namely, without habit, without interaction construct, and with interaction construct (research model) (Cavanaugh et al., 2000; Limayem et al., 2007; Chiu et al., 2012). At the beginning, the present study used hierarchical regression to test Hypotheses 1, 2, 3, 4, and 5. In the analysis, the control variables were entered into the model first, followed by perceived usefulness, enjoyment, and behavioural control, CFIP, and mobile anxiety. Table 7 shows the incremental R^2 values. Perceived usefulness, enjoyment, behavioural control, and CFIP were

hypothesised to have a positive relationship, whereas mobile anxiety would have a negative relationship with Facebook mobile's continuance intention of users (Hypotheses 1, 2, 3, 4, and 5). In Model 1, controlling for gender, age, and education, perceived usefulness and perceived enjoyment predicted Facebook mobile's continuance intention ($\beta = 0.188, p < 0.01$; and $\beta = 0.406, p < 0.001$, respectively). In this model, Hypotheses 1 and 2 were supported, but Hypotheses 3, 4, and 5 were not supported. Meanwhile, in Model 2, Facebook mobile's continuance intention was predicted not only by perceived usefulness and enjoyment, but also by the subscale of CFIP – secondary use and that of mobile anxiety – mobile anxiety on capability and contexts (NP and NC). Similar to Model 1, Hypotheses 1 and 2 were supported in Model 2, whereas Hypotheses 3, 4, and 5 were not. However, the subscale form (or first-order factor) of CFIP and mobile anxiety was observed to increase the explanatory power of Facebook mobile's continuance intentions. Furthermore, the subscale of CFIP-secondary use demonstrated a positive influence ($\beta = 0.169, p < 0.05$), and the two subscales of mobile anxiety exhibited a significant influence ($\beta = 0.097, p < 0.1$; $\beta = 0.134, p < 0.01$) on Facebook mobile's continuance intentions of users.

Table 7 Results of the regression analysis for MSMS continuance intention

Variable	Step 1	Step 2	
		Model 1	Model 2
Gender	-0.132*	-0.120**	-0.109*
Age	-0.002	0.048	0.048
Education	-.041	0.059	0.075 ⁺
Perceived usefulness		0.188**	0.185**
Perceived enjoyment		0.406***	0.414***
Perceived behavioural control		0.023	-0.040
Concerns for information privacy		0.017	
Collection			-0.084
Unauthorised access			-0.083
Errors			0.015
Secondary use			0.169*
Mobile anxiety		0.076	
Mobile anxiety on capability (NP)			-0.097 ⁺
Mobile anxiety on contexts (NC)			0.134**
Change in R ² (compare to step 1)		0.314***	0.341***
R ²	0.019	0.332	0.359
Adjust R ²	0.011	0.318	0.338
F (df)	2.366 (3, 372) ⁺	34.467 (5, 367)***	21.455 (9, 363)***

Notes: N = 376; standardised coefficients are shown. ⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8 shows the results of Facebook mobile's continuance usage of users, which was hypothesised to have a positive relationship with Facebook mobile's continuance intentions (Hypothesis 6). The habit construct was hypothesised to serve as a moderator

between Facebook mobile's intentions and usage (Hypothesis 8). The findings indicated that users' Facebook mobile continuance intentions positively predicted Facebook mobile's continuance usage ($\beta = 0.446, p < 0.001$), and the interaction item, continuance intention \times habit, was significant ($\beta = -0.619, p < 0.05$). Therefore, Hypotheses 6 and 8 were supported.

Table 8 Results of the moderated regression analysis for MSMS continuance usage

Variables	<i>The role of habit</i>		
	<i>Without habit</i>	<i>As a direct effect</i>	<i>As a moderator</i>
Gender	0.155**	0.138**	0.142**
Age	0.033	0.064	0.068
Education	0.027	0.011	0.008
Continuance intention	0.446***	0.252***	0.644**
Habit		0.316***	0.604***
Continuance intention \times habit			-0.619*
Change in R ²		0.061***	0.009*
R ²	0.208	0.270	0.279
Adjust R ²	0.200	0.260	0.267
F (df)	24.417 (4, 71)***	30.956 (1,370)***	4.779 (1, 369)

Notes: N = 376; standardised coefficients are shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 9 shows that the habit construct should not be a moderator between mobile anxiety and Facebook mobile's continuance intentions of users because the interaction item, anxiety \times habit, was not statistically significant (Model 1: $\beta = 0.206, p = 0.30 > 0.05$; Model 2: $\beta_A = 0.046, p = 0.787 > 0.05$; $\beta_B = 0.183, p = 0.435 > 0.05$). Hypothesis 7 was not supported. Although Hypothesis 8 was supported, the two hypotheses should not be combined to form the moderated mediation. Thus, performing the moderated mediation test was unnecessary.

4.2 Moderating effect of habit

Table 10 presents several results, particularly those of testing Model 1 in which the habit construct was not incorporated. This model accounts for 20.8% and 31.8% of the variance in users' Facebook mobile continuance usage and intentions, respectively. Table 10 shows the results of testing Model 2 in which the habit construct was not incorporated. This model accounted for 20.8% and 33.8% of the variance in users' Facebook mobile's continuance usage and intentions, respectively. Furthermore, in Table 10, the continuance model with habit is shown to have a direct effect on Facebook mobile's continuance usage. The results of the analyses demonstrated a standardised beta for habit and continuance intention of 0.316 and 0.252, respectively, and an R² of 0.260 for Facebook mobile's continuance usage in Model 1.

Table 9 Results of the moderated regression analysis for MSMS continuance intention

Variables	The role of habit					
	Model 1			Model 2		
	Without habit	As a direct effect	As a moderator	Without habit	As a direct effect	As a moderator
Gender	-0.120**	-0.113**	-0.114**	-0.109*	-0.114**	-0.117**
Age	0.048	0.046	0.051	0.048	0.042	0.047
Education	0.059	0.045	0.048	0.075 ⁺	0.056	0.058
Perceived usefulness	0.188***	0.094 ⁺	0.097 ⁺	0.185**	0.105*	0.108*
Perceived enjoyment	0.406***	0.233***	0.239***	0.414***	0.236***	0.239***
Perceived behavioural control	0.023	-0.053	-0.058	-0.040	-0.066	-0.066
Concerns for information privacy	0.017	-0.022	-0.027			
Collection				-0.084	-0.089 ⁺	-0.091 ⁺
Unauthorised access				-0.083	-0.049	-0.050
Errors				0.015	-0.014	-0.016
Secondary use				0.169*	0.143*	0.146**
Anxiety	0.076	0.119**	-0.067			
Mobile anxiety on capability (NP)				-0.097 ⁺	0.022	-0.073
Mobile anxiety on contexts (NC)				0.134**	0.129*	-0.158
Habit		0.478***	0.354**		0.463***	0.347**
Mobile anxiety × habit			0.206			
Mobile anxiety A × habit						0.046
Mobile anxiety B × habit						0.183
Change in R ²		0.134***	0.002	0.341***	0.118***	0.001
R ²	0.332	0.466	0.468	0.359	0.458	0.479
Adjust R ²	0.318	0.453	0.453	0.338	0.458	0.457
F (df)	22.828 (8,367)***	91.807 (1,366)***	1.079 (1, 365)	21.455 (9,363)***	81.488 (1,362)***	0.476 (2,360)

Notes: N = 376; standardised coefficients are shown. ⁺p < 0.1, *p < 0.05, **p < 0.01, ***p < 0.001.

Table 10 Hierarchical test

<i>The role of habit</i>	<i>R²</i>	<i>F-statistics</i>	<i>F-statistics</i>
Without habit	0.208		0.074
Habit as a moderator (research model)	0.267	0.010	
Habit as a direct effect	0.260		

Note: F-statistics tests the results of two models.

As illustrated in Figures 2–3, Model 1 accounted for 26.7% and 31.8% of the variance in users’ Facebook mobile’s continuance usage and intentions, respectively. The path coefficient between habit and Facebook mobile’s continuance usage was 0.604 and higher, whereas that between Facebook mobile’s continuance intentions and usage was 0.644 and lower than the model without habit as a moderating variable. Cohen (1988) suggested that the difference in *R*-squares can be used in assessing the overall effect size *f*² for the interaction, in which 0.02, 0.15, and 0.35 were regarded as small, moderate, and large effects, respectively. A small *f*² must be understood to not necessarily imply an unimportant effect. In the hierarchical difference test, the interaction effect was determined to have an effect size of 0.010, which is a small effect. The inclusion of the interaction effects indicates an equally strong β of -0.619 that increases *R*² for usage to 0.267. As indicated in Table 9, Models 1 and 2 in which habit is proposed to moderate the link between users’ Facebook mobile’s continuance intentions and usage, exhibited a significantly higher explanatory power than other models although the effect sizes of both models are small (0.074 and 0.010, respectively). Therefore, the moderation effect of habit significantly influences the relationship between Facebook mobile’s continuance intention and usage.

Figure 2 Second-order factor model of Model 1: habit as a moderator

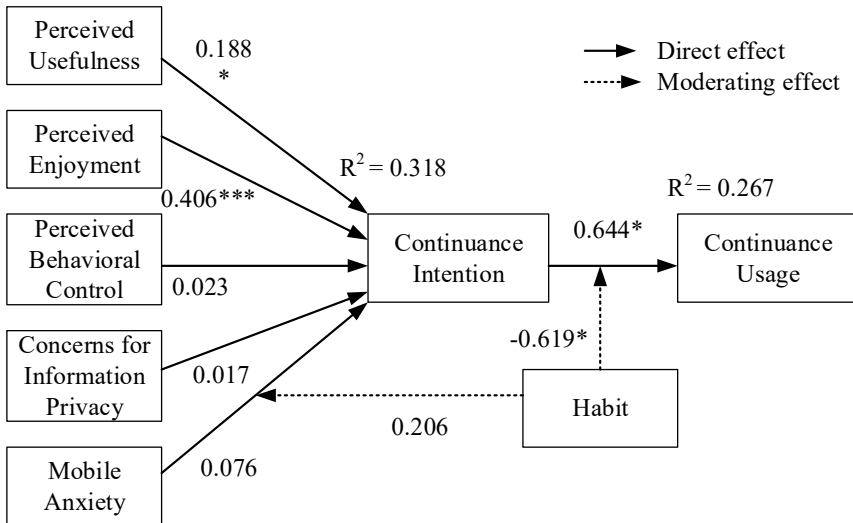


Figure 3 First-order factor model of Model 2: habit as a moderator

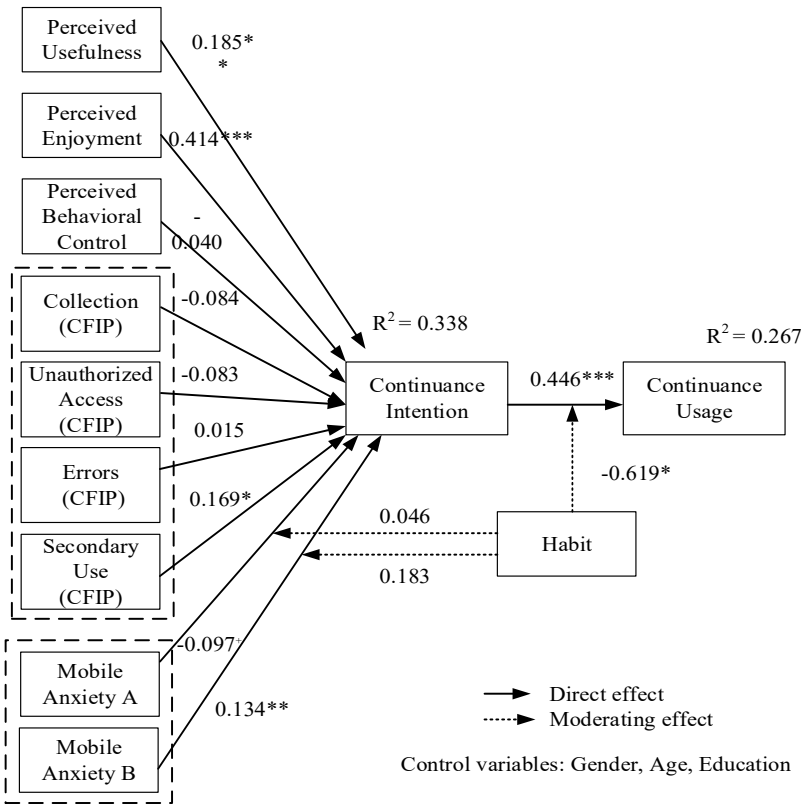
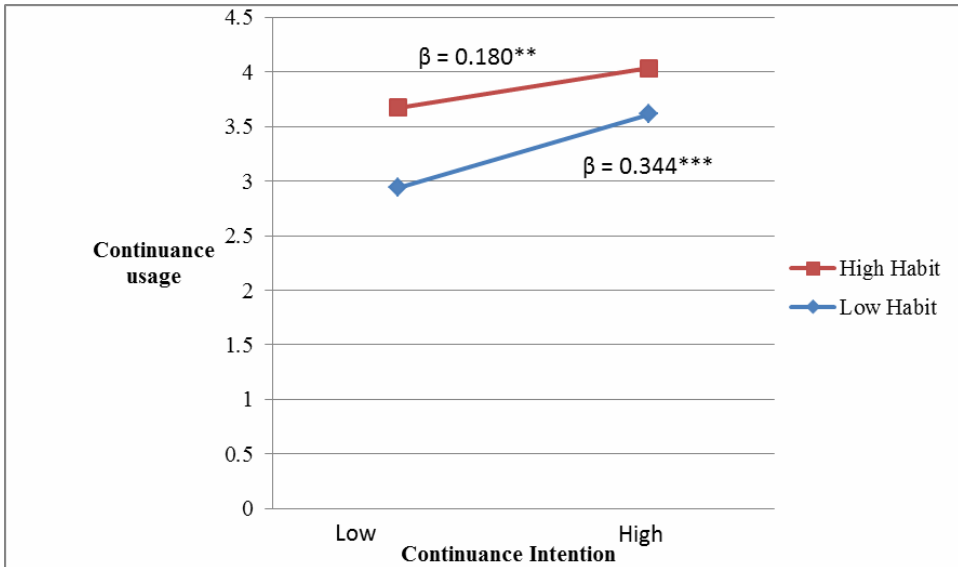


Figure 4 illustrates the coefficient estimates, particularly the pattern of their interaction with the results of simple slope analysis reported, as suggested by Aiken and West (1991). The interaction of Facebook mobile’s continuance intentions and habit was significantly related to usage. The magnitude of the coefficient between Facebook mobile’s continuance intentions and usage was determined to be negatively influenced by the habit level of users. With users’ demographic factor controlled for, a higher Facebook mobile’s continuance intention was found to increase significantly Facebook mobile’s continuance usage of users with either high habit ($\beta = 0.180, p = 0.006 < 0.01$) or low habit ($\beta = 0.344, p = 0.000 < 0.001$).

The results provided supported Hypotheses 1, 2, 6, and 8. However, the effects of concerns for perceived behavioural control, information privacy, and mobile anxiety on Facebook mobile’s continuance intentions were less pronounced than expected. By contrast, the effects of perceived usefulness and enjoyment on Facebook mobile’s continuance intentions were strongly supported. Furthermore, secondary use, which is one subscale of CFIP, positively influenced Facebook mobile’s continuance intentions. Mobile anxiety on contexts (NC) had a positive relationship. However, mobile anxiety on capability (NP) had a negative relationship with Facebook mobile’s continuance intentions. The moderating effect of habit on the relationship between users’ Facebook mobile’s continuance intentions and usage was thus supported, whereas that between users’ mobile anxiety and Facebook mobile’s continuance intentions was not significant.

The results suggest that for people with either high or low habit, the increase in users' Facebook mobile's continuance usage is attributed to continuance intentions.

Figure 4 Paradigm of the interaction term (see online version for colours)



Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; two-tailed tests.

5 Discussions

This study developed and tested a model explaining the determinants of MSMS continuance intentions with habit as a moderator to predict continuance usage. By integrating perceived usefulness, enjoyment, behavioural control, CFIP, and mobile anxiety, this study simultaneously examined the effects of these constructs on Facebook mobile's continuance intentions and tested the influence of habit on continuance usage. The findings of this study provide useful implications for researchers and MSMS practitioners.

5.1 Theoretical implications

From the insights obtained from this study, several implications are worthy of consideration for theory development and research. First, although the roles of privacy concerns, perceived enjoyment, satisfaction, and anxiety have been intensively examined by prior research at several different contexts, little work has been conducted to test the combined effects of perceived usefulness and enjoyment as well as privacy concerns and mobile anxiety on MSMS continuance intention and usage. The model, which was based on ECM and motivation theory to explain usage on MSMS, can help in understanding the effect of the application of these constructs on MSMS.

Second, the findings suggest that MSMS continuance intentions and usage have a complex link. Adding habit as a moderator is a first step toward a better understanding of

this relationship. Future work should continue to examine the complex relationship among habit, MSMS continuance intentions, and usage to increase the variance explained in continued MSMS usage. For instance, the specific threshold level of habit at which habit is the main driver of continuance MSMS usage may be explored. In this study, continuance intentions remain an influential predictor of MSMS continuance usage. In contrast to the findings of Limayem et al. (2007), the results of the present research identified habit as an accelerator rather than a suppressor, that is, MSMS continuance intentions are increased as habit moderates MSMS usage.

Third, habit and continuance intentions represent two different promoters of MSMS continuance usage. Habit is an automatic behavioural response triggered by a situational stimulus without being preceded by a cognitive analysis process (Chiu et al., 2012), whereas continuance intentions emerge from a combination of cognition and emotion. When MSMS usage is executed at a stable context and becomes habitual, the MSMS continuance intentions of active users will be strengthened and influence continuance usage. Therefore, the interaction between MSMS continuance intentions and usage should be examined rather than assumed that both operate similarly. Moderating variables that turn simple and major effects into more insightful conditional relationships should be identified.

Fourth, although perceived usefulness is a strong predictor of behavioural intention in the original TAM and ECM, previous views were incomplete because perceived usefulness is generally considered an extrinsic motivation for users in using MSMS. The role of intrinsic motivation has been ignored in the TAM and ECM. However, this study theorises and empirically demonstrates that perceived enjoyment is a stronger predictor of MSMS continuance intentions than perceived usefulness that is viewed as an intrinsic motivation. Furthermore, perceived enjoyment as an intrinsic motivation dominates perceived usefulness as an extrinsic motivation in this study. The result is interesting to explore in terms of the conditions under which such a situation occurs.

Fifth, beyond the investigation of the previously mentioned theoretical issues, application-oriented problems should be addressed. Lindbladh and Lyttkens (2002) indicated that people with low social positions are highly inclined to rely on their habits and are therefore less likely to change their behaviour. In the context of MSMS continuance usage, the process of habit formation at different levels of the individuals may be examined by focusing on the identification and comparing the different types of habits across levels.

5.2 Practical implications

From a practical perspective, the findings imply important recommendations to instructors, academic institutions, MSMS designers, and developers. First, habit significantly moderates the relationship between continuance intention and usage of MSMS. As the habitual use is formed, the conscious attention diminishes. The results inform MSMS designers, developers, and users that getting oneself to form the habit of using MSMS on the mobile is critical to attain sustainable usage and enhance information and knowledge sharing and exchange among communities to which they belong.

Second, the results imply that continuance intention remains as the primary factor in stimulating users' MSMS continuance usage and that the enhancement of users' continuance intentions is of primary importance. Understanding the effect of users'

perceived usefulness and enjoyment on their MSMS continuance intentions allows marketers to design marketing campaigns that fit social and personal needs of users.

Third, public policy makers can help the virtual society by formulating stringent rules and laws for controlling the usage of MSMS. Such rules would be beneficial in several situations, such as preventing the unintentional exposure of personal data given that secondary use significantly influences MSMS continuance intentions compared with the three other subscales of CFIP. To control the secondary use, MSMS developers should consider including a safety feature that can protect the usage of these applications. In addition, Stewart and Segars (2002) concluded that from a practical perspective, the existence of a second-order factor can considerably simplify the building of statistical models that associate CFIP with other constructs. However, the results of the current study indicated that CFIP has an insignificant effect on MSMS continuance intentions, and secondary use in the first-order factor model could be viewed as an antecedent of CFIP. The framing of CFIP as a first- or higher-order factor must be reconciled with the essence of its theoretical definition, which has significant implications for researchers attempting to situate the construct within the nomological network of other variables.

Fourth, the research demonstrates the influence of the two subscales of mobile anxiety on MSMS continuance intentions. One subscale is mobile anxiety on capability (NP) that is related to user anxiety on capability to use MSMS, whereas the other subscale is mobile anxiety on contexts (NC) that are related to user anxiety on MSMS usage. MSMS developers or managers should design an interface that is easy to understand and use to strengthen users' continuance intentions. Such design should increase the confidence of users in their MSMS ability and reduce their anxiety on MSMS usage.

6 Conclusions

This study aims to examine thoroughly the complex relationships among perceived usefulness, enjoyment, and behavioural control, as well as CFIP, mobile anxiety, habit, and continuance intentions and usage in the context of MSMS. The major concerns are the moderating effect of habit on the relationship between MSMS continuance intentions and usage and the identification of the antecedents of MSMS continuance intentions. This study identified the five antecedents of MSMS continuance intentions as individuals' perceived usefulness and enjoyment, secondary use as the subscale of CFIP, and the two subscales, mobile anxiety on capability and on contexts. All of the five antecedents are significant predictors of MSMS continuance intentions. The extent of the explained variance in MSMS continuance intentions suggests that these antecedents are important although other pivotal antecedents that have a high explanatory power may exist. Future research can focus on the pivotal antecedents. In comparing the importance of the five antecedents of MSMS continuance intention, users' perceived enjoyment has a dominant role, followed by perceived usefulness, secondary use, mobile anxiety on contexts (NC), and mobile anxiety on capability (NP). Therefore, intrinsic motivation (perceived enjoyment) dominates extrinsic motivation (perceived usefulness), and both forms of motivation intrinsically and extrinsically stimulate MSMS continuance intentions. The results of this study are consistent with prior research related to motivation theory (e.g., Davis et al, 1992; Thong et al., 2006; Kim et al., 2009; Kim, 2010).

The results of the present study indicate that habit significantly affects MSMS continuance usage. Specifically, habit exerts a negative moderating effect on the relationship between MSMS continuance intention and usage. The interaction between habit and MSMS continuance intention in the prediction of MSMS continuance usage suggests that a trade-off occurs between habit and MSMS continuance usage. Consequently, a strong habit increases the influence of MSMS continuance intention on usage.

6.1 Limitations

Immense effort has been exerted to design and implement this research, but several limitations remain. Thus, the results obtained in this study may not hold equally well in the context of other information technologies. First, the sample primarily consisted of students (39.3%). Detailed analyses are required to exclude possible confounded effects of the participants' demographic characteristics on the constructs of this research.

Second, the sample consisted of only active online users who volunteered for this study. Thus, the findings may be biased. Individuals who had discontinued their use of MSMS may differ in terms of perceived usefulness, enjoyment, and behavioural control, as well as CFIP, mobile anxiety, and habit compared with active MSMS users. Therefore, the results should be interpreted as only explaining the continuance intentions and usage of current online MSMS users. Further research will be required to obtain results that will be applicable to non-users or disaffected users.

Third, this study applies a cross-sectional survey method that reveals an on-going nature of continuance usage. Continuous interaction between these research constructs is possible. Moreover, given the cross-sectional data, all statistically supported relationships can only be viewed as tentative.

Fourth, habit is posited to be a moderator between continuance intentions and usage. However, other relationships and even reciprocal relationships between habit and other research constructs are identified in this study. For instance, habit can be a major predictor of perceived usefulness and ease of use, as suggested by Gefen (2003), and habit can be a predictor of continuance intentions toward e-commerce websites (Liao et al., 2006). Future work should incorporate this perspective into the model design. Finally, the current study has neglected the socio-cultural or political influence on users' MSMS usage. Only one item was used as the continuance usage construct, as suggested by Wu and Wang (2005). Thus, the variance was 26.7%. Although the general variance of prior research investigating IS usage is approximately 30%, as argued by Meister and Compeau (2002), the model requires further refinement by including other important variables that affect MSMS continuance.

6.2 Future works

Although this study has contributed to a better understanding of habit in particular and MSMS continuance in general, as well as raised several interesting questions for future work, additional theorising and empirical investigation of MSMS user behaviour at later usage phases are necessary. A more refined knowledge about the proposed variables and relationships may ultimately benefit MSMS developers and users in their attempt to cope successfully with the challenges engendered by more exciting and versatile MSMS on smartphones.

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