The Adoption of Personal Internet Banking in Vietnam

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Abstract

Based on previous studies a model of the determinants of an individual's intentions to use Personal Internet Banking (PIB) services was formulated, tested and developed to arrive at a final model. Independent determinants included an individual's personal characteristics, personality traits, and level of trust in the bank. New findings stressed the important mediation roles played by Perceived Ease of Use and Perceived Usefulness in the total effect of Trust on Behavioral Intention while all of the personal characteristics, except for Position Description, were found to be less important than in several previous studies. Among the personality traits the direct effect of Agreeableness on Perceived Ease of Use and Neuroticism on Behavioral Intention had not been reported in previous PIB studies and the same was true for other significant correlations involving Extraversion, Conscientiousness, and Openness to Experience. Based on the final causal model practical implications of the findings are discussed.

Keywords: Five-Factor Model, Personal Internet Banking, Structural Equation Modeling, Technology Acceptance Model

Introduction

Personal Internet Banking (PIB) is one of many services that banks provide as alternative channels for customers to access their bank accounts instead of going to the bank. With PIB, benefits accrue from serving more customers with fewer employees and lessening loads on ATMs (e.g. employees and security staff needed to refill money, maintenance, electricity, and rental of location). PIB frees the customer from the constraints of time and place to conduct their personal banking transactions.

Internet banking in Vietnam has appeared later than in other countries in the region. There are only three banks providing PIB services in 2004. However, the Vietnam government was trying to keep up with other country in the area so the number of banks providing PIB services has increased to 45 out of a total of 50 banks in December 2011 (Vietnam Ministry of Industry and Trade, 2012). Increasing the use of PIB is one of the efforts to push the development of e-commerce, which is an objective in the mission of the Vietnam government to 2020 (State Bank of Vietnam, 2011).

Although the Vietnam government and banks are encouraging business and citizens to use cashless transactions with many promotion programs and projects, the success of PIB is not only dependent on government and bank support but also customer acceptance (Le, 2011). Only few studies of PIB have been conducted for the case of Vietnam and they do not reflect the complete picture of PIB in Vietnam (Wang and Pho, 2009; Chong et al., 2010; Le, 2011; Lin and Nguyen, 2011) because the infrastructure to support PIB in Vietnam has only been implemented quite recently and extra services are still in the experimental stage. This study is motivated by the need to further understand the effects on an individual's attitude to the adoption of PIB in Vietnam and to addressing the lack of current research on this topic in Vietnam.

Literature Review

There were numerous studies of PIB where the unit of analysis is

an individual user. Most of studies have been conducted of particular user groups (Amin, 2007; Calisir and Gumussoy, 2008; Anuar et al., 2012), in developing countries (Jaruwachirathanakul and Fink, 2005; Al-Somali et al., 2008; Qureshi et al., 2008), and countries with different cultures and religions (Nor et al., 2010). Most studies identified factors that affect the adoption of PIB technologies (Sattabusaya, 2008; Lee, 2009; Winley, 2011; Yousafzai and Yani-de-Soriano, 2012) while others focused on resistance factors and barriers may cause a low rate of adoption (Rotchanakitmnuai and Speece, 2003; Munusamy et al., 2012). Customer satisfaction and intentions to continue to use PIB services were the dependent variables in most of the studies (Liao and Cheung, 2008; Wang and Pho, 2009; Seyal and Rahim, 2011; Akram and Asghar, 2012). The majority of the studies tested an explanatory theoretical model while the remainder was exploratory or descriptive in nature. Many researchers have used TAM as a theoretical basis for studying PIB (Lee, 2009; Boyacioglu et al., 2010; Nasri, 2011; Sanayei et al., 2011; Kesharwani and Bisht, 2012; Sentosa et al., 2012; Yousafzai and Yani-de-Soriano, 2012) while other theories have received relatively less attention compared to TAM even though they were more recently than TAM (e.g. UTAUT) (Foon and Fah, 2011).

The ***Technology Acceptance Model (TAM)*** introduced by Davis (1986) is a further extension of ***Theory of Reasoned Action (TRA)*** by (Fishbein and Ajzen, 1975) to the Information Systems (IS) context with the purpose to provide an explanation of the determinants of computer acceptance among users. TAM replaced TRA's attitude beliefs with two technology acceptance variables: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). PU refers to the degree to which a person believes that using a particular system would enhance his/her job performance; and PEU refers to the degree to which a person believes that using a particular system would be free from effort (Davis et al., 1989). As shown in Figure 1, TAM posits that PU and PEU are of primary relevance for technology acceptance behavior. Similar to TRA, TAM postulates that actual system use is determined by behavioral intention (BI), but differs

in that BI is viewed as being jointly determined by an individual's attitude toward using the system and perceived usefulness (PU).

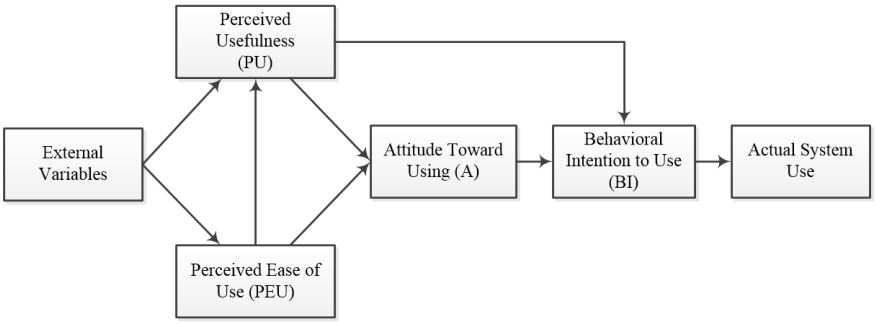

Figure 1: The Technology Acceptance Model (TAM) (Davis et al., 1989)

TAM does not include TRA's subjective norms (SN) as a determinant of BI because it is considered to be the least understood aspect of TRA. It is difficult to disentangle direct effects of SN on BI from indirect effects via Attitude (Davis et al., 1989). Based on empirical evidence, the final conceptualization of TAM excluded the Attitude construct because it did not fully mediate the effect of PEU on intention and the link from PU to BI seemed more significant (Davis et al., 1989; Venkatesh et al., 2003). TAM was adopted worldwide and tested across a wide range of IS applications and evolved over the years. Researchers have extended TAM in three primary ways to provide greater understanding and explanatory power. The first approach involved including factors from related models (e.g., Social Norm and Perceived Behavioral Control from Theory of Planned Behavior). The second approach involved introducing additional or alternative beliefs to the model (mostly from diffusion of innovation theory such as trialability, compatibility, visibility or result demonstrability). The third approach involved examining external variables effecting PEU and PU such as personality traits and demographic characteristics (Wixom and Todd, 2005).

Conceptual Framework Development

Based on a comprehensive survey of the variables and the theoretical bases used in previous studies, 15 important variables were identified and classified into four groups: three variables related to TAM; six variables related to personal characteristics of individuals; trust as an important indicator of an individual's attitude to PIB; and five variables related to an individual's personality traits, which reflect cultural influences measured at the level of an individual.

TAM Variables: In the concept of PIB, Perceived Ease of Use was defined as the extent to which a person believes that using PIB is free of effort.; Perceived Usefulness was defined as the extent to which a person believes that using PIB enhances their banking activities and Behavioral Intention was defined as the strength of an individual's intention to use PIB (Prompattanapakdee, 2009). Perceived Usefulness and Perceived Ease of Use are in all of the previous studies which adopted TAM. However, in many studies (Van Raaij and Schepers, 2008; Aldás-Manzano et al., 2009; Chong et al., 2010; Le, 2011; Kesharwani and Bisht, 2012; Yousafzai and Yani-de-Soriano, 2012) the Attitude construct was removed from TAM while retaining Intention because this two variables are significantly positively correlated when the adoption of a technology is voluntary (Davis et al., 1989; Venkatesh et al., 2003) and PIB is a self-service which operates based on the voluntariness of use by the customer. Also, although Intention and Actual Use in general technology adoption might be different in the context of voluntary PIB usage they have been shown to be significantly correlated (Prompattanapakdee, 2009). For this reason, many studies removed Actual Use from TAM and instead used Intention as the dependent variable based on the understanding that if usage is voluntary and the individual's intentions to use the system are strong (weak) then actual usage will be high (low).

Trust: In the concept of PIB, Trust was defined as the assured confidence an individual has in the bank's ability to provide reliable internet banking services (Le, 2011). Trust is an important

factor in many social interactions involving uncertainty and dependency (Grabner-Kräuter and Faullant, 2008) especially in relation to Internet based applications and PIB in particular. In PIB, Trust is understood as the confidence which the individual has in the bank's ability to provide reliable Internet banking services.

Previous studies have identified consistently the significant role of Trust in PIB. Some researchers refer to Credibility instead of Trust but these constructs have a similar meaning. Results from previous studies show that Trust has a direct effect on an individual's perceptions of the usefulness and ease of use as well as their intention to use the system (Aldás-Manzano et al., 2009; Alsajjan and Dennis, 2010; Le, 2011). According to Winley (2011), customers lose their trust for four main reasons: security; the service provider's reputation; privacy; and risks associated with reliability of the services.

Personal Characteristics: Several previous studies of PIB have included variables related to personal characteristics (Gender, Age, Level of Education, Internet Experience, Internet Banking Experience, and Position Description) as having an influence on the individual's intention to use PIB services. Yousafzai et al. (2009) found effects of Age and Gender on Perceived Usefulness and Intention to use PIB. Computer self-efficacy (related to level of education) is also an important factor with effects on Perceived Usefulness and Perceived Ease of Use (Le, 2011; Sentosa et al., 2012) and Intention to Use (Chau and Ngai, 2010; Kesharwani and Tripathy, 2012; Sentosa et al., 2012). It seems obvious that because PIB is a self-service technology based on the Internet it will attract more attention from those who often use and work in an Internet environment and this was confirmed by the studies of Chan and Hosein (2010) and Ozdemir and Trott (2009). Ozdemir and Trott (2009) also found that customers with higher incomes in more senior positions with higher levels of education who work longer hours are likely to adopt PIB. However, in Vietnam, because income is often not reported precisely by individuals in questionnaires it was not among the personal characteristics that were included in the theoretical model for the study.

Culture Characteristics and the Individual's Personality: Hofstede (2011) states that: "*Culture is the collective programming of the mind that distinguishes the members of one group or category of people from others*". Culture characteristics are related to standard operating procedures, unstated assumptions, tools, norms, values, and habits in sampling the environment (Triandis, 2001). Personality is defined as "*an individual's characteristic pattern of thought, emotion, and behavior, together with the psychological mechanisms—hidden or not—behind those patterns*" (Triandis, 2001).

As noted by Triandis (2001), when studying the relationship of culture and psychology it is imperative to keep the level of analysis distinct because the results of analyses are often different depending on the level of analysis. Triandis proposed to link the cultural (societal) and individual (psychological) levels of analysis by noting that customs are aspects of culture and habits are aspects of personality and he hypothesizes a correspondence between customs, norms, and values on the one hand and habits and patterns of individual behavior on the other hand. In PIB studies several researchers have considered (social) norms as determinants of PIB adoption (Nor et al., 2008; Shi et al., 2008; Lee, 2009; Al-Majali and Nik Mat, 2010; Alsajjan and Dennis, 2010; Zolait, 2010; Abbesi and Haghighy, 2011; Nasri and Charfeddine, 2012).

In a study of personality and culture, Hofstede and McCrae (2004) also noted the confusion between levels of analysis. One possibility for relating dimensions of culture and personality factors was measuring the culture dimensions in individuals. This has been tried most often in the case of individualism-collectivism with notably inconsistent results. In the study by Prompattanapakdee (2009), only Personal Relationships, which was one of the two cultural factors (Personal Relationships and Peer Influence) included in the study, was found to have a significant negative effect on the actual use of PIB and this was contrary to the significant importance of both of these cultural factors in the results of the earlier study of PIB adoption in Thailand by Jaruwachi-

rathanakul and Fink (2005).

An alternative approach for examining the effects of culture on the adoption of PIB is to focus attention on cultural influences measured at the level of the individual user rather than the level of the whole society. This is achieved by measuring personality traits of the individual users (Hofstede and McCrae, 2004) and previous studies have used personality traits to predict the use of technology (Bellman, 1998). Jacques et al. (2009) found the effect of personality traits as antecedents of perceived usefulness and perceived ease of use.

One strongly supported theoretical basis for personality trait psychology is the five-factor model (FFM) taxonomy of five traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. Numerous empirical studies of the FFM show solid evidence for consistency by subjects to describe themselves and others, with stability throughout adult-life spans (Migliore, 2011). Openness to Experience (OE) is defined as the degree to which an individual is intellectually curious, open to new ideas, involves imaginative and creative cognition styles; Conscientiousness (CO) is defined as the degree to which individuals control, regulate, and direct their impulses related to decision-making and action-oriented behaviors; Extraversion (EX) is defined as the degree to which an individual is assertive, action oriented, and enjoys opportunities for excitement, attention drawing, and talking. Agreeableness (AG) is defined as The degree to which an individual is concerned for cooperation and social harmony, and behavioral characteristics including being considerate, friendly, generous, helpful, and willing to compromise one's own interests for others; and Neuroticism (NE) is defined as the extent to which an individual displays excessive worry that causes mental distress, emotional suffering, and an inability to cope with day-to-day life activities (Migliore, 2011).

Based on the thorough literature review mentioned above, a conceptual model is developed to test in this study. The theoretical model includes 15 variables as shown in Figure 2.

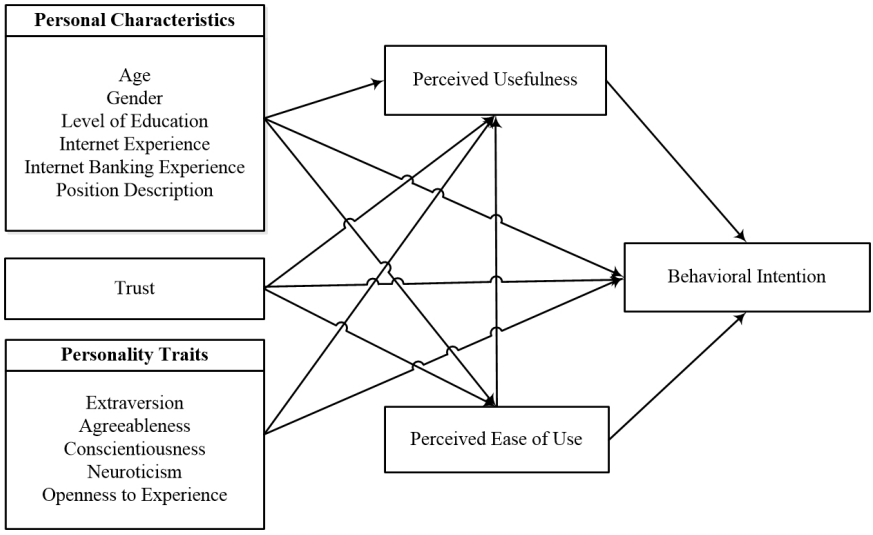

Figure 2: Theoretical model

Following are the 34 research hypotheses associated with the direct effects among the variables in Figure 2.

H1. Age has a significant negative direct effect on Perceived Usefulness

H2. Age has a significant negative direct effect on Perceived Ease of Use

H3. Age has a significant negative direct effect on Intention to Use PIB

H4. Gender has a significant direct effect on Perceived Usefulness

H5. Gender has a significant direct effect on Perceived Ease of Use

H6. Gender has a significant direct effect on Behavioral Intention

H7. Level of Education has a significant positive direct effect on Perceived Usefulness

H8. Level of Education has a significant positive direct effect on Perceived Ease of Use

H9. Level of Education has a significant positive direct effect on Behavioral Intention

H10. Internet Experience has a significant positive direct effect on Perceived Usefulness

H11. Internet Experience has a significant positive direct effect on Perceived Ease of Use

H12. Internet Experience has a significant positive direct effect on Behavioral Intention

H13. Internet Banking Experience has a significant positive direct effect on Perceived Usefulness

H14. Internet Banking Experience has a significant positive direct effect on Perceived Ease of Use

H15. Internet Banking Experience has a significant positive direct effect on Behavioral Intention

H16. Position Description has a significant positive direct effect on Perceived Usefulness

H17. Position Description has a significant positive direct effect on Perceived Ease of Use

H18. Position Description has a significant positive direct effect on Behavioral Intention

H19. Trust has a significant positive direct effect on Perceived Usefulness

H20. Trust has a significant positive direct effect on Perceived Ease of Use

H21. Trust has a significant positive direct effect on Behavioral Intention

H22. Extraversion has a significant positive direct effect on Perceived Usefulness

H23. Extraversion has a significant positive direct effect on Behavioral Intention

H24. Agreeableness has a significant positive direct effect on Perceived Usefulness

H25. Agreeableness has a significant positive direct effect on Behavioral Intention

H26. Conscientiousness has a significant positive direct effect on Behavioral Intention

H27. Conscientiousness has a significant positive direct effect on

Perceived Usefulness

H28. Neuroticism has a significant negative direct effect on Perceived Usefulness

H29. Neuroticism has a significant negative direct effect on Behavioral Intention

H30. Openness to Experience has a significant positive direct effect on Perceived Usefulness

H31. Openness to Experience has a significant positive direct effect on Behavioral Intention

H32. Perceived Usefulness has significant positive direct effect on Behavioral Intention

H33. Perceived Ease of Use has a significant positive direct effect on Behavioral Intention

H34. Perceived Ease of Use has significant positive direct effect on Perceived Usefulness

Research Design and Methodology

A cross-sectional field study design was used to collect data using a questionnaire designed to measure the variables in the theoretical model. English and Vietnamese language versions of the questionnaire were prepared and reviewed by a focus group of five PIB users representing the target population. Suggested modifications were included in revised versions of the questionnaire which was then administered in a pilot study using a sample of 10 suitable participants. Their responses and comments were noted and any necessary modifications were incorporated into the final versions of the questionnaire and the Vietnamese language version was then used in the full study.

The target population for the study was individuals who were at least 18 years of age with at least one month of Internet and PIB experience. A purposive sampling method was decided with a minimum sample size of approximately 400 individuals which represented a 95 percent confidence level and 5 percent precision in

what was assumed to be an unknown but very large target population. Also, this sample size satisfied the criteria for the statistical validity of the structural equation modeling (SEM) and other statistical techniques used in the study (Kline, 2005). Sampling was done in stages using educational institutions, organizations, social media, and the researcher's personal contacts. Individuals were invited to complete the questionnaire online at a designated web site where explanations of the purpose of the questionnaire and instructions for its completion were available.

Regarding the measurement items, all the measuring instruments were taken from previous validated literature related to personality and technology adoption researches. The measuring instrument for FFM were taken from (Donnellan et al., 2006). Measuring instruments for TAM were adopted from (Davis, 1989). Measuring instruments for Trust and Personal Characteristic were taken from (Prompattanapakdee, 2009).

Model Analysis and Results

Preliminary Analyses

A sample of 411 completed questionnaires was obtained. There were no missing values for any of the questions and when a randomly selected 10 percent were checked for data entry errors none were detected. Twenty questionnaires were found to include at least one outlier value and these were removed leaving a final sample of 391 questionnaires which satisfied the sample size determined for the study.

Principal Component factor analysis was used to test the construct (discriminant and convergent) validity of the measures of the latent model variables. The results of the factor analysis show that each indicator for a latent variable has a factor loading of magnitude at least 0.4 and an associated eigenvalue of at least 1 (Straub et al., 2004). Consequently, all of the indicators demonstrated satisfactory construct validity. The internal consistency reliability of each set of indicators was tested using Cronbach alpha coefficients. The excellent values of the alpha

coefficients could not be improved by the removal of any of the indicators.

T-tests were used to determine statistically significant differences ($p < 0.05$) between males and females among the mean values of the model variables. There were no significant differences due to Gender among the endogenous latent variables Perceived Usefulness, Perceived Ease of Use, and Behavioral Intention and the only significant difference between males and females among the endogenous variables was for Age where males on average were 19 months older than females. Consequently, because it was not plausible to propose that Gender was a cause for any of the exogenous variables and it had no influence on the endogenous variables it was removed from the theoretical model. Thus, the research hypotheses **H4, H5, H6** in associated with direct effects of Gender on Perceived Usefulness, Perceived Ease of Use, and Behavioral Intention were not supported.

Descriptive Statistics

From Table 1 it is seen that the magnitudes of the values for skewness and kurtosis are within the acceptable limits of 3 and 7, respectively, required for the use of maximum likelihood estimation in subsequent SEM analyses (Kline, 2005).

Table 1: Descriptive statistics for model variables

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Variable	Mean	Std. Dev.	Skewness	Kurtosis
Age	31.71	7.389	1.192	2.824	IN3	5.99	1.034	-.978	.384
Education	16.97	1.782	.851	2.293	**Extraversion**	4.67	1.216	-.249	-.263
Position Description	4.80	1.815	-.474	.084	EX1	4.91	1.255	-.245	-.143
Internet Experience	57.33	16.756	-1.785	1.848	EX2	4.56	1.383	-.181	-.313
Internet Banking Experience	37.71	21.809	.028	-1.352	EX3	4.73	1.262	-.176	-.221
Perceived Ease of Use	5.81	1.067	-.995	.700	EX4	4.47	1.256	-.187	-.359
PE1	5.87	1.103	-1.019	.778	**Agreeableness**	5.34	.838	-.093	-.615
PE2	5.83	1.141	-.962	.503	AG1	5.53	.913	-.189	-.602
PE3	5.81	1.102	-.920	.595	AG2	5.25	.988	-.081	-.618
PE4	5.81	1.127	-.956	.651	AG3	5.37	.922	-.090	-.420
PE5	5.77	1.120	-.890	.574	AG4	5.21	.950	.062	-.621
PE6	5.76	1.173	-.867	.215	**Conscientiousness**	5.42	1.055	-.587	-.301
Perceived Usefulness	5.85	.964	-.777	-.027	CO1	5.39	.999	-.467	.075
PU1	5.96	1.007	-.852	.250	CO2	5.29	1.184	-.463	-.222
PU2	5.79	1.048	-.626	-.158	CO3	5.56	1.144	-.577	-.102
PU3	5.73	1.080	-.535	-.575	CO4	5.46	1.231	-.423	-.767
PU4	5.76	1.023	-.670	-.103	**Neuroticism**	3.81	1.119	.188	.235
PU5	5.99	1.021	-.888	.286	NE1	3.84	1.283	.140	.198
Trust	5.44	1.062	-.526	.085	NE2	3.65	1.142	.145	.123
T1	5.38	1.153	-.445	-.177	NE3	3.87	1.300	.115	-.015
T2	5.44	1.098	-.518	.023	NE4	3.90	1.108	.335	.367
T3	5.43	1.123	-.518	-.098	**Openness to Experience**	4.84	1.269	-.491	-.052
T4	5.49	1.097	-.604	.183	OE1	5.01	1.342	-.563	.268
Behavioral Intention	5.84	1.052	-1.005	.811	OE2	4.70	1.337	-.363	-.164
IN1	5.79	1.139	-1.019	.932	OE3	4.75	1.316	-.303	-.308
IN2	5.74	1.119	-.873	.568	OE4	4.91	1.357	-.432	-.214

For the latent model variables t-tests were used to examine the difference between the mean value of each indicator and the value of 4 which represented a neutral point on their 7-point Likert measurement scales. It was found that all of the model variables and indicators, except for Neuroticism, were significantly greater than the neutral value ($p < 0.05$). For Neuroticism the means are significantly less than the neutral value ($p < 0.05$). This indicated that the respondents scored highly on desirable personality traits, lowly on the undesirable trait Neuroticism, and they had very positive responses toward the PIB system and its features.

Table 2: Summary of the correlations among model variables

Variable	A	E	J	IE	IBE	PE	PU	T	IN	EX	AG	CO	NE
Age (A)	1												
Education (E)	**.507**	1											
Position Description (J)	**.500**	**.228**	1										
Internet Experience (IE)	.097	**.115**	.075	1									
Internet Banking Experience (IBE)	.061	.060	**.101**	**.389**	1								
Perceived Ease of Use (PE)	.073	-.018	**.115**	.024	.036	1							
Perceived Usefulness (PU)	.049	-.019	.050	.000	.038	**.636**	1						
Trust (T)	-.003	-.047	.023	.047	.077	**.485**	**.474**	1					
Behavioral Intention (IN)	.039	-.042	.095	-.090	-.005	**.574**	**.548**	**.477**	1				
Extraversion (EX)	-.082	-.046	.060	-.011	.072	**.126**	**.161**	**.210**	**.135**	1			
Agreeableness (AG)	-.003	.019	.052	-.079	.095	**.235**	**.261**	**.291**	**.189**	**.404**	1		
Conscientiousness (CO)	.014	.010	.018	-.038	.069	**.146**	**.132**	**.174**	**.118**	**.176**	**.373**	1	
Neuroticism (NE)	**-.165**	**-.132**	**-.143**	.016	-.013	-.082	**-.102**	-.047	**-.140**	-.057	-.081	**-.128**	1
Openness to Experience (OE)	-.056	.038	.034	.058	.034	-.009	.071	.073	-.014	**.159**	**.266**	**.150**	**-.163**

Notes: (a) Shaded cells contain correlation coefficients associated with the direct causal effects included in the theoretical model; **(b)** Statistically significant correlation coefficients are in bold type ($p < 0.05$).

Considering the significant correlations in Table 2 in relation to the causal effects proposed in the theoretical model it is observed that: **(a)** among the causal effects involving the five variables (Age, Level of Education, Internet Experience, Internet Banking Experience, and Position Description) the only significant correlation is that associated with the causal effect of Position Description on Perceived Ease of Use; **(b)** there are significant correlations associated with all of the causal effects involving Trust; **(c)** there are significant correlations associated with all of the all of the causal effects associated with the five personality traits with the exception of Openness to Experience; and **(d)** there are significant correlations associated with all of the causal effects among Perceived Usefulness, Perceived Ease of Use, and Behavioral Intention. Significant (non significant) correlations do not represent significant (non significant) causal effects but they do suggest that a causal effect may be significant (non significant). In particular, it is noted that the three personality traits Extraversion, Agreeableness, and Conscientiousness are each significantly correlated with Perceived Ease of Use even though the three corresponding direct causal effects are not included in the theoretical model.

Model Analysis And Development

The SEM analysis was used for the theoretical model using Amos software. Table 3 shows the values of the range of fit statistics for the theoretical model in Figure 2 as recommended by Kline (2005).

Table 3: Fit statistics for the theoretical model

Model	N	N_c	NC (χ^2/df)	RMR	GFI	AGFI	NFI	IFI	CFI	RMSEA
Theoretical Model	391	256	1418.559/779 = 1.821	.132	.863	.834	.931	.972	.971	.043
			R^2: Perceived Ease of Use (0.32); Perceived Usefulness (0.49); Behavior Intention (0.54)							

Note: R^2 is the proportion of the variance of each endogenous variable that is explained by the variables affecting it.

From Table 3 it is seen that some of the fit statistics are reasonably satisfactory. However, there are 23 direct effects that are small in magnitude and not statistically significant. This raises the possibility that their removal from the theoretical model may produce a simpler model with an improved set of fit statistics.

It was noted above that there were three additional plausible direct causal effects that may be included in the theoretical model each with an associated correlation that was statistically significant at a level of 0.05 or less (Extraversion → Perceived Ease of Use, Agreeableness → Perceived Ease of Use, and Conscientiousness → Perceived Ease of Use). Also, as mentioned above there are 23 direct effects highlighted that are considered for removal from the theoretical model. These 26 effects were made optional in the model and the specification search facility in Amos 18 was used to analyze the hierarchy of 226 (67,108,864) models. In accordance with the recommendation by Kline (2005) the model in this hierarchy with the smallest value for the fit statistic Normed Chi-square (NC) was selected as the final model which is shown in Figure 3 with the fit statistics in Table 4.

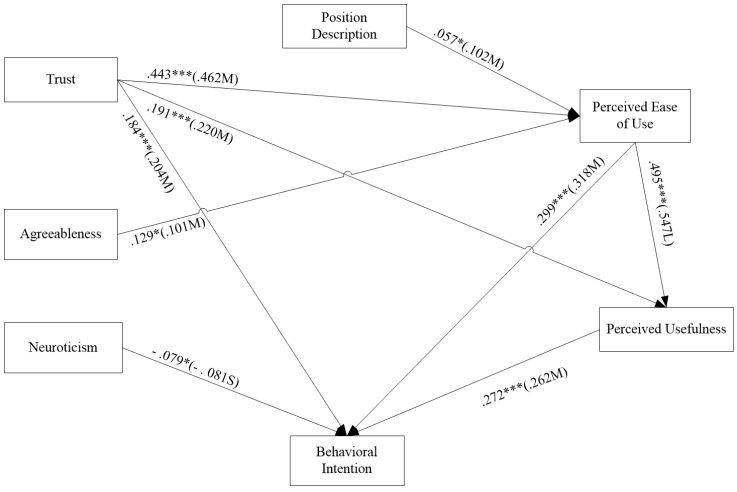

Figure 3: Final model.

Table 4: Fit statistics for the final model

Model	N	N_c	NC (χ^2/df)	RMR	GFI	AGFI	NFI	IFI	CFI	RMSEA
Final Model	391	258	536.767/310 = 1.732	.009	.920	.910	.957	.981	.981	.021
			R^2: Perceived Ease of Use (0.48); Perceived Usefulness (0.58); Behavior Intention (0.63)							

Note: R^2 is the proportion of the variance of each endogenous variable that is explained by the variables affecting it.

From Table 4 it is seen that the final model is much simpler than the theoretical model. It has very acceptable fit statistics and reasonable proportions of the variance of the endogenous variables are explained. From Figure 3 it is seen that all of the 23 direct effects in the theoretical model that were considered for removal were not present in the final model. Among the three additional causal effects proposed for inclusion only Agreeableness → Perceived Ease of Use was included in the final model. In particular, it is noted that the direct effect Neuroticism → Behavioral Intention is negative, small, but statistically significant at a level of 0.05. However, if it is removed from the model then the value of Normed Chi-square (NC) increases. All of the other direct effects are positive, medium, and statistically significant at a level of 0.05 or less.

Table 5 shows a complete analysis of all of the direct and indirect effects in the final model.

Table 5: Analysis of the final model

Variable		Effect	Intervening Variable		Dependent Variable
			Perceived Ease of Use	Perceived Usefulness	Behavioral Intention
Exogenous Variable	Trust (T)	Direct	.443***(.462M)	.191***(.220M)	.184***(.204M)
		Indirect	Nil	T-PE-PU .219 ***(.253M)	T-PU-IN .049***(.058S) T-PE-IN .132***(.147M) T-PE-PU-IN .060***(.066S)
		Total Indirect	Nil	.219 ***(.253M)	.241***(.271M)
		Total	.443***(.462M)	.410***(.473M)	.425***(.475M)
	Position Description (J)	Direct	.057*(.102M)	Nil	Nil
		Indirect	Nil	J-PE-PU .028*(.056S)	J-PE-IN .017*(.032S) J-PE-PU-IN .008*(.015S)
		Total Indirect	Nil	.028*(.056S)	.025*(.047S)
		Total	.057*(.102M)	.028*(.056S)	.025*(.047S)
	Agreeableness (AG)	Direct	.129*(.101M)	Nil	Nil
		Indirect	Nil	AG-PE-PU .064*(.055S)	AG-PE-IN .039*(.032S) AG-PE-PU-IN .017*(.014S)
		Total Indirect	Nil	.064*(.055S)	.056*(.046S)
		Total	.129*(.101M)	.064*(.055S)	.056*(.046S)
	Neuroticism (NE)	Direct	Nil	Nil	- . 079*(- .081S)
		Indirect	Nil	Nil	Nil
		Total Indirect	Nil	Nil	Nil
		Total	Nil	Nil	- . 079*(- .081S)
Intervening Variable	Perceived Ease of Use (PE)	Direct	Nil	.495***(.547L)	.299***(.318M)
		Indirect	Nil	Nil	PE-PU-IN .135***(.143M)
		Total Indirect	Nil	Nil	.135***(.143M)
		Total	Nil	.495***(.547L)	.434***(.461M)
	Perceived Usefulness (PU)	Direct	Nil	Nil	.272***(.262M)
		Indirect	Nil	Nil	Nil
		Total Indirect	Nil	Nil	Nil
		Total	Nil	Nil	.272***(.262M)

In Table 5: **(a)** the variables on indirect paths are shown; **(b)** the unstandardized effects are shown followed by the symbol *, ** or *** if the effect is statistically significant at a level of 0.05, 0.01, or 0.001, respectively. If no symbol is used then this indicates that the effect is not statistically significant; **(b)** in parentheses the standardized effect is shown with S, M, or L to indicate that the magnitude of the effect is small, medium, or large, respectively, where small corresponds to an effect of magnitude less than 0.1, medium is from magnitude 0.1 to less than 0.5, and large is a magnitude of 0.5 or more.; and **(c)** all of the effects are statistically significant at a level of 0.05 or less; **(d)** The indirect effect of Trust on Perceived Usefulness

(Trust → Perceived Ease of Use → Perceived Usefulness) is greater in magnitude than the direct effect Trust → Perceived Usefulness which indicates that Perceived Ease of Use is a significant mediator in this indirect effect of Trust on Perceived Usefulness; and **(e)** the total of the indirect effects of Trust on Behavioral Intention through mediators Perceived Ease of Use and Perceived Usefulness exceeds the magnitude of the direct effect of Trust on Behavioral Intention.

Discussion and New Findings

Trust has the most influence on Behavioral Intention follow by Perceived Ease of Use and Perceived Usefulness. There are small positive influences on Behavioral Intention from Position Description, Agreeableness and a very small negative influence from Neuroticism.

Perceived Ease of Use has the most important influence on Perceived Usefulness follow by Trust, Position Description and Agreeableness.

Trust has the most important influences on Perceived Ease of Use, followed by Position Description and Agreeableness.

From the finding of study H17, H19, H20, H21, H29, H32, H33, H34 were supported. H22, H23, H24, H25, H26, H27, H28 were not found a significant direct causal effect but partial support evidenced by a statistically significant correlation between the variables ($p < 0.05$). H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, H16, H18, H30, H31 were not supported by the finding.

It is seen that almost half of the hypotheses represented in the theoretical model were either fully or partially supported. From those that were not supported it is noted that the amount of previous experience with the Internet or with PIB had little influence on an individual's intentions to use PIB. The same is true for an individual's age, gender, level of education, and level of responsibility in their employment position. Among the five personality traits Openness to Experience played the least influential role while all other traits were more involved in the determination of the individual's

intentions to use PIB services.

New Findings

The most important new findings concern the significant mediation roles played by Perceived Ease of Use and Perceived Usefulness in the total very important effect of Trust on Behavioral Intention. In previous studies the effect of Trust on Behavioral Intention is well known and expected but the mediation roles played by Perceived Ease of Use and Perceived Usefulness in this effect have not been reported.

As noted above the personal characteristics Age, Gender, Level of Education, Internet Experience, and Internet Banking Experience were found to be less important in this study of PIB than in several previous studies conducted in other contexts although Position Description did have an important medium direct effect on Perceived Ease of Use. Among the five variables representing personality traits the medium direct effect of Agreeableness on Perceived Ease of Use has not been reported in previous PIB studies. The other new results concerning the other four personality traits Extraversion, Conscientiousness, Openness to Experience, and Neuroticism have been reported in previous studies concerned with the adoption and use of other technologies (e.g. smartphones and online shopping) but these may be considered new findings in relation to PIB adoption.

The new findings in this study may be related to a combination of factors in Vietnam:

(a) The use of PIB may be encouraged by: (i) bank fees which are imposed when a customer withdraws cash from an ATM; and (ii) opening hours of banks are similar to those of other organizations which makes it difficult for customers to leave their work place to conduct transactions at the bank.

(b) The social environment: (i) Vietnamese cities such as Hanoi and Ho Chi Minh are badly affected by traffic jams every which makes going to a bank time consuming and frustrating; and (ii) The high

rate of crimes (hold-ups, pick-pockets, and motorbike robbery) present a high risk to individuals carrying money to or from bank sites.

(c) Online services: (i) over-the-top content applications such as social networks (Facebook), mobile text, and voice messaging are developing rapidly (e.g. WhatsApp, WeChat, Zalo, Viber, Skype, and Line) which has encouraged people to use smart-phones and tablets for online shopping and banking; (ii) online payment portal companies (e.g. SmartLink, Banknetvn, Nganluong.vn, BaoKim,vn, and Onepay.vn) fill the gap between the customer and the service provider and allow customers of every bank to have access to the same services such as bill payment, mobile phone top-up, or shopping online via the payment portal.

Conclusion

This study examined the adoption of PIB services in Vietnam. From a theoretical perspective, the study found that: **(a)** respondents had a very positive attitude to PIB and strong intentions to use PIB with no significant differences between males and females in terms of their intentions to use PIB services or their perceptions of the ease of use and usefulness of PIB; **(b)** support for many of the findings of previous studies; and **(c)** important effects not reported in previous studies.

From a practical perspective the study provides advice for those responsible for the development and use of PIB services. Based on the findings, to increase an individual's intention to use PIB banks need to increase the individual's trust in the bank followed by increasing the individual's perceptions that PIB is easy to use and useful. **(a)** In order to increase the level of trust in PIB banks need to pay attention to offline and online transactions, professionalism in bank activities, thoughtfulness in customer care, security in online transactions, and maintaining a good public reputation. The more an individual trusts the bank the more they find the services easy to use mainly because of their increased familiarity with the interface and the way in which the system works. Increased trust also means increased feelings that

the PIB services are useful; **(b)** The characteristics of individuals which need to pay attention are position description, and levels of agreeableness and neuroticism. Banks should focus on the customers who have high levels of responsibility in their employment because they tend to have high intentions to use PIB. Not surprisingly, those with higher the levels of responsibility are busier and seek a more effective way of working with banks. When promoting PIB services banks should focus on appealing to individuals who are highly agreeable (i.e. friendly, generous, trusting, and believe that others are honest). On the other hand, neurotic people (i.e. those who experience unpleasant emotions, are often depressed, and feel nervous and vulnerable) are unlikely to use PIB services despite any promotion activities by banks.

The measurement reliability and validity of this cross-sectional field study are considered to be quite satisfactory and the same claim is made for the internal and statistical validity of the research design. The main limitations on the study are concerned with the reliability and external validity of the research design because this one of very few studies conducted recently in the dynamic context the development of PIB services in Vietnam. Consequently, it is strongly recommended that the study be repeated in this environment. Also, it is not claimed that the study included all possible causal effects and future studies may wish to propose and test additional causes and effects.

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