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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Empirical analysis of internet banking adoption in Vietnam

Bang Nguyen-Viet^{1*} and Khanh Ngoc Huynh¹

Abstract: This study defines and measures the key factors driving consumers' adoption of internet banking in Vietnam, and comprises both qualitative and quantitative research. Qualitative research was carried out through focus group discussions with 12 consumers, while quantitative research was conducted through interviews with 475 bank customers in Vietnam. The results indicate the following: (i) the adoption of internet banking in Vietnam is directly affected by perceived usefulness, attitude, perceived risk, innate innovativeness, domain-specific innovativeness, and internet experience; (ii) perceived risk is directly affected by innate and domain-specific innovativeness; (iii) perceived ease of use is directly affected by innate and domain-specific innovativeness; (iv) consumers' attitudes are directly affected by perceived usefulness and perceived ease of use; and (v) perceived usefulness is directly affected by perceived ease of use. However, this study had certain limitations. First, owing to limited resources in conducting the research, the sample size consisted of only 475 consumers. Second, this study employed the sampling technique of direct and email interview methods.

Subjects: Banking; Credit & Credit Institutions; Investment & Securities

Keywords: adoption of internet banking; internet banking; consumer innovativeness; technology acceptance model; Vietnam

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PUBLIC INTEREST STATEMENT

Financial services are benefitting substantially from Industry 4.0 by significantly adopting its growth and market size. The banking sector has adopted internet banking as a delivery channel for its services. Therefore, many commercial banks have been rapidly investing in digital banks to enable their survival within this inevitable development trend. This study defines and measures the key factors driving consumers' adoption of internet banking in Vietnam, based on data obtained from interviews with 475 Vietnamese customers who use internet banking for their transactions. The results provide evidence for bank managers regarding the role of perceived usefulness, attitude, perceived risk, innate innovativeness, domain-specific innovativeness, internet experience, and perceived ease of use in consumers' adoption of internet banking.

1. Introduction

The impact of Industry 4.0 on the modern global economy has already emerged significantly. Today, many organisations have responded to the competitive business environment by implementing e-business as part of their business strategies. With the growth of the internet, it is inevitable for banks to gravitate toward providing online banking to their customers (Chong et al., 2010).

The Industry 4.0 concept, that is powered by software engineering and information technology, has had a strong impact on financial services. Industry 4.0 has already had a highly desirable impact on the global economy by contributing many new industry sectors and considerable market value. Financial services have benefitted substantially from Industry 4.0 by significantly adopting its growth and market size. The banking sector has adopted internet banking as a delivery channel for its services.

In Vietnam, there are four state-owned commercial banks, 31 joint-stock commercial banks, nine wholly foreign-owned banks, two joint-venture banks, two policy banks, one cooperative bank, and 48 foreign bank branches. Vietnam had almost 19,000 ATMs and 270,000 point-of-sale (POS) terminals in place in 2019. In 2020, 78 banks offered internet payment solutions. Mobile payments are available at 47 banks, and 29 banks accept QR payments (Australian Trade and Investment Commission, 2020). All of them aim to become smarter at analysing customer behaviour and obtaining customer insights. This will enable them to provide personalised products and services and, in turn, gain a competitive advantage in the market. Vietnam, one of the fastest-growing nations in the world, has also been steadily integrating into the world economy and has achieved many successes in recent years, with aspirations to rise higher in global value chains. Moreover, the impact of Industry 4.0 on Vietnam's banking sector will become more profound in the coming years because almost all industries and business sectors are fully contributing to leveraging the power of Industry 4.0. All banks in Vietnam are striving to adopt new technologies as soon as possible and introduce new digital products; overall, there is competition between them, and a market game in which everyone claims to be a leader in this field is ensuing.

According to the Australian Trade and Investment Commission (2020), the large majority of Vietnamese (69 percent of the adult population) do not have a bank account. This was the highest rate in Southeast Asia. Moreover, credit card penetration rates are even lower, at just 2 percent of the population. Therefore, they have not experienced new banking technology products and services such as the internet and mobile banking, that are still being streamlined (Lin et al., 2014).

Internet banking is defined as the delivery of banking services through the internet, offering numerous potential benefits to implementing financial organisations, especially through the utilisation of user-friendly technologies and the reduction of the restrictions of physical locations or geographical areas (Madinios et al., 2013). Therefore, internet banking allows customers to use their banks' websites to perform common banking transactions, such as paying bills (e.g., for electricity, water, telephone, or the internet), transferring funds, printing statements, and inquiring about account balances, exchange rates, and interest rates (Lin et al., 2014). Over the last few years, internet banking services have grown rapidly due to the benefits offered by these services for both the banking sector and consumers. As far as the banking sector is concerned, internet banking services have the ability to provide competitive advantages, cost efficiencies, wider geographical reach, establish brand names, and provide customised services. For consumers, whether individuals or companies, internet banking services enable the ability to perform banking transactions, such as fund transfers, loan applications, opening of fixed deposit accounts, and letters of credit or investment activities. In addition, they accommodate services for personal finance management facilities, such as importing data into personal accounting software and account aggregation. Internet banking services allow bank consumers to perform financial transactions anytime and anywhere.

Online banking products have many advantages over traditional banking services, especially regarding cost saving and improved competitiveness for banks. Moreover, online banking provides both high accuracy and fast service to customers. Internet banking is a banking channel that allows consumers to perform a wide range of financial and nonfinancial services through a bank website (Rahi et al., 2019).

As this is an inevitable development trend, many commercial banks have been investing in digital banks to survive. Notably, when the banking industry is responsible for digital transformation and promoting non-cash payments, the level of competition in banking operations is and will become increasingly exciting.

The concept of consumer innovativeness has emerged since the early 1970s; it has become an important issue, particularly because of its prominent role in the adoption and diffusion of new and innovative products and services. It has been extensively researched by scholars in different fields and has been established as an important concept for various practitioners. The diffusion of innovations theory is extensively used by marketers to promote the adoption of their products. In such cases, marketers generally find an early set of adopters that are passionate about the product. These early adopters are responsible for converting the product's utility to mainstream audiences.

Worldwide, many studies have focussed on the relationship between consumer innovativeness (CI) and the adoption of internet banking. Kaushik and Rahman (2014) state that CI is an important issue, particularly because of its role in the adoption and diffusion of new and innovative products and services. The significantly positive effect of consumer innovativeness on internet banking adoption has been confirmed by different researchers when attempting to identify the factors affecting intention to use internet banking (Aldás-Manzano et al., 2009; Chao et al., 2013; Chauhan et al., 2019; Hirunyawipada & Paswan, 2006).

Several empirical studies in Vietnam (Chong et al., 2010; Lin et al., 2014) have focussed on the factors that impact the adoption of internet banking. However, there are still limited empirical research works that have attempted to integrate consumer innovativeness and perceived risk with the technology acceptance model—a widely accepted model in technology-related studies (Chauhan et al., 2019). This study bridges this gap by investigating the effects of consumer innovativeness and perceived risk with the technology acceptance model on adopting internet banking in emerging markets such as Vietnam. This research also investigates customers' internet experience related to the adoption of internet banking, and the difference between consumers using Vietnamese and foreign banks regarding mean intentions to adopt internet banking, apropos ways to target consumer segments.

The study will reveal important factors to assist researchers investigating issues related to the adoption of internet banking, and strategies in an emerging market. The findings of this study offer valuable insights into the effects of consumer innovativeness and perceived risk, using the technology acceptance model, on internet banking adoption in Vietnam. Additionally, the research will clarify the difference between male and female, Vietnamese banks, and foreign banks in terms of acceptance of internet banking.

2. Literature review

2.1. Technology acceptance model

The technology acceptance model (TAM), developed by Davis in 1986, explains computer acceptance determinants that are general and capable of explaining user behaviour across a broad range of end-user computing technologies and user populations (Rondan-Cataluña et al., 2015).

The TAM is one of the most cited theoretical frameworks for predicting the acceptance and use of new information technology (software and information systems) within organisations. In this model, system use is directly determined by behavioural intention to use, which is, in turn, influenced by users' attitudes toward using the system and the perceived usefulness of the system (Nasri & Charfeddine, 2012). The TAM is based on two particular beliefs, perceived usefulness and perceived ease of use, as the main antecedents of computer acceptance (F. D. Davis, 1986).

3. Behavioural intention to use

Behavioural intention to use (IT) measures the success of acceptance in the use of technology. Fishbein and Ajzen (1975) state that behavioural intentions to use measures individuals' interest, that subsequently induces certain behaviours or connects individuals' attitudes and recognition of service contributions. The relationship between attitude and behavioural intention to use leads to an individual's intention to use a service (Davis et al., 1989). The literature review revealed three theories related to technology acceptance that are mainly used to study behavioural intentions to use: theory of reasoned action (TRA), theory of planned behaviour, and TAM. These theories measure the success of development in the use of technology and are employed differently, based on the study's context.

In this study, consumers' intention to use internet banking in Vietnam incorporates their willingness to use internet banking should they have adequate facilities, like internet access, computers, and smartphones, and their intention to use it for future banking transactions.

4. Perceived usefulness

Perceived usefulness (PU) is defined as the prospective user's subjective probability that using a specific application system will increase their job performance within an organisational context (F.D. Davis, 1989). Thus, online banking users will adopt the system if they believe it has certain benefits, such as reducing the time spent on going to the bank and improving efficiency. Notably, perceived usefulness has been established to have a significantly stronger effect on adoption than perceived ease of use (Lu et al., 2005).

In this study, the perceived usefulness construct implies the consumers' belief that using internet banking services in Vietnam will enable them to accomplish their tasks more easily and swiftly, and that they envisage the use of internet banking to be advantageous.

5. Perceived ease of use

Perceived ease of use (PEU) is the degree to which a person believes that using a particular system will be effortless (F.D. Davis, 1989). It is one of the major behavioural beliefs that influence user intention toward technology acceptance in both the original and revised TAM (Akturan and Tezcan 2012). As an individual who perceives a system as easy to use will most likely develop favourable beliefs toward it, perceived ease of use is inclined to positively influence attitude toward usage in the TAM (Lok, 2015). Consumers can perceive the ease of use of internet banking if it is user-friendly and simple to operate and understand. The easier it is to use the technology, the more useful it is perceived to be, and the more likely it is to be accepted by users (Irfan & Chendragiri, 2015).

The perceived ease of use in the Vietnamese banking context can be understood as the feeling of ease of operation of the internet banking application by Vietnamese consumers such that they find their transactions to be clear, specific, and simple to understand. They can use such a system proficiently in a short period.

The TAM is widely used by researchers and practitioners to help predict and elucidate user acceptance of information technologies (Yiu et al., 2007). Researchers have suggested that, in

addition to utilising feelings and/or attitudes to explain the use of a particular technology, external variables may be added to the TAM to improve the model's predictive power (F. D. Davis, 1986).

Over time, the TAM has been implemented in various contexts beyond the mere acceptance of computers in the workplace. Therefore, the TAM has become well established as a robust, powerful, and parsimonious model for predicting user acceptance (Cheng et al., 2006).

There is also extensive research that provides substantial evidence that perceived usefulness and perceived ease of use have a significant positive effect on consumers' attitudes and intentions toward adopting internet banking (Kesharwani & Bisht, 2012; Maditinos et al., 2013; Marakarkandy et al., 2017). There is sufficient evidence in the literature that TAM constructs, perceived ease of use, and/or perceived usefulness have significant effects either directly or indirectly on the adoption of the intention to use internet banking (F.D. Davis, 1989; George, 2018). Therefore, the authors propose the following hypotheses:

H₁: Perceived usefulness positively influences consumer attitude toward the adoption of internet banking.

H₂: Perceived usefulness positively influences consumer intention to adopt internet banking.

H₃: Perceived ease of use positively influences consumer attitudes toward internet banking adoption.

H₄: Perceived ease of use positively influences perceived usefulness in the adoption of internet banking.

6. Attitude

Attitude toward the behaviour refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the specific behaviour (Ajzen, 1991). According to the TRA, behavioural intention can be explained by two determinant factors: a personal factor termed attitude toward behaviour, and a person's perception of social pressures termed subjective norms (Fishbein & Ajzen, 1975). An individual intends to exhibit a certain behaviour when evaluating it positively. Attitudes are determined by the individual's beliefs about the consequences of performing the behaviour (behavioural beliefs), weighted by their evaluation of those consequences (outcome evaluations) (Nasri & Charfeddine, 2012).

It has been widely recognised that an individual's attitude has a significant impact on their use of technology. Various studies have been conducted using customer attitude as the underlying construct to predict the adoption and use of technology. Akturan and Tezcan (2012) and Ayo et al. (2016) report that attitude is the major determinant of internet banking adoption intention. The attitude toward using internet banking services in Vietnam shows the willingness and desire to use internet banking when demands related to banking transactions arise. Therefore, hypothesis H₅ is proposed as follows:

H₅: Consumers' attitudes toward internet banking positively influence their intention to adopt internet banking.

7. Theory of innovation

The early formulation of the diffusion paradigm originated from the work of Ryan and Gross (1943). Subsequently, Rogers et al. (1962) proposed four elements of diffusion—innovation,

communication channel, time, and social system—in their book entitled *Diffusion of Innovation*. Diffusion occurs through a series of communication channels over a period of time among members of a social system. Rogers (2003) proposes five stages of the adoption process: knowledge, persuasion, decision, implementation, and confirmation.

Knowledge is defined as where an individual is exposed to an innovation's existence and gains an understanding of how it functions. Hence, persuasion is explained as where an individual forms a favourable attitude toward innovation (Thakur & Srivastava, 2015). Rogers (2003) states that individuals at this stage become psychologically involved and seek information from their peers about innovation. The third stage of the adoption process is the decision. This is defined as a situation in which an individual engages in activities that lead to selection regarding either to adopt or reject an innovation. The fourth stage of the adoption process is implementation, being when an individual puts an innovation into use. Finally, the fifth stage is confirmation, whereby an individual seeks reinforcement for an innovation decision that has already been made, but may be reversed if exposed to conflicting messages about it.

The concept of CI emerged in the early 1970s, and it has become an important issue, particularly due to its prominent role in the adoption and diffusion of new and innovative products and services.

Since 1971, different researchers have studied the relationship between consumer innovativeness and adoption behaviour extensively, and several studies on the different antecedents of innovativeness and measurements of consumer innovativeness have followed. Hirunyawipada and Paswan (2006) define consumer innovativeness as the tendency to willingly embrace change, try new things, and buy new products more often and quicker than others. Innovativeness reflects a customer's degree of adoption of products and ideas that are new to their individual experience (Aldás-Manzano et al., 2009). Lassar et al. (2005) believe that a personal innovativeness construct is conceptualised as the degree and speed of adoption of innovation by an individual. In a marketing context, the construct has been measured via purchase intentions and opinions for certain new products, the number of new products owned, and the relative time of adoption for particular new products. This is usually applied to domain-specific products and services. In general innovation diffusion research, it has long been recognised that highly innovative individuals actively seek information concerning new ideas (Lu et al., 2005).

This study considers two types of consumer innovativeness as the factors affecting the intention to use internet banking: innate innovativeness (II) and domain-specific innovativeness (DSI). The first perspective of consumer innovativeness is a generalist perspective that identifies consumer innovativeness based on “innate innovativeness”. This perspective treats consumer innovativeness as a personality trait or characteristic of any individual that differentiates them from others in society. The second perspective of consumer innovativeness treats innovativeness in a specific domain of a consumer's interest, and considers innovativeness as DSI (Kaushik & Rahman, 2014).

8. Innate innovativeness

Several empirical researchers consider CI to be a generalised personality trait, and they define it as consumer innate innovativeness (Kaushik & Rahman, 2014). Chao et al. (2013) consider this (II) as an innovative predisposition, being the degree to which an individual adopts an innovation without communicating with others' previous purchasing experiences. Zhang and Hou (2017) define innate consumer innovativeness as an innate and unobservable personality that reflects an individual's innate tendency to innovate, traits, and cognitive styles.

Many marketing researchers have also focussed on this generalised perspective of innovativeness, that segments consumer innovators based on their individual personality and cognitive style

—their way of processing information and approach to problem solving—as distinct from cognitive level, ability, or complexity (Im et al., 2003).

Moreover, CI is a potential personality trait—the consumers’ desire for new and different experiences—and this desire can drive individuals to strongly pursue new and different stimuli. An II consumer in the Vietnamese banking context can be seen as a creative person who is always looking for new ways of doing things, being the first in the group to embrace innovation, and feel active and creative in thought and behaviour.

According to Chauhan et al. (2019), this relationship needs to be further investigated in the context of new product adoption. Therefore, the authors have proposed hypothesis H_6 as follows:

H_6 : Innate innovativeness positively influences consumers’ intention to adopt internet banking.

9. Domain-specific innovativeness

Domain-specific innovativeness (DSI) is the tendency to learn about and adopt new products and services within a specific domain of interest. Furthermore, DSI is a deeper construct of innovativeness and is more specific to the area of interest (Chauhan et al., 2019).

The II construct has been rather unsuccessful in explaining CI by using a general model, because CI might be related to a consumer’s interest in a specific product category and be less of a personality characteristic of the individual (Citrin, 2000).

Therefore, in addition to a generalist perspective of CI, another crucial perspective has emerged—the particularist perspective. This CI perspective treats innovativeness in the specific domain of a consumer’s interest and considers innovativeness as DSI (Kaushik & Rahman, 2014).

Subsequently, researchers applied DSI in the context of various products and services related to information technology. In the context of high-technology products, Hirunyawipada and Paswan (2006) applied DSI and identified the positive effect of high technology product adoption. Thakur and Srivastava (2015) applied DSI in an online shopping context and identified it as a key construct to improve online shopping adoption intention, as it shows direct and positive effects. A few studies have also applied this construct (DSI) in the context of online banking and have confirmed its direct and positive influence on online banking acceptance (Aldás-Manzano et al., 2009; Lassar et al., 2005). Upon exploring the relationship between CI, self-efficacy, and internet banking adoption, researchers have found that DSI characteristics are all significantly related to online banking adoption. However, the innate consumer innovativeness variable has a significant negative effect on e-banking adoption.

Consumers with DSI in the Vietnamese banking context can be understood as those who are especially interested in internet banking. They are the first to know about new internet banking services and are always looking for new services to experience. They are always actively seeking information about new internet banking services and their desire to use them.

Based on the above discussion, this study assumes that the DSI plays a significant positive role in the adoption of internet banking. Therefore, the authors have proposed hypothesis H_7 is proposed as follows

H₇: Domain-specific innovativeness positively influences consumers' intentions to adopt internet banking.

10. Consumer innovativeness and perceived ease of use

According to Moore (1999), early adopters and innovators adopt technological innovations earlier than others because of the perceived ease of use. Lu et al. (2005) also reported a strong indirect effect of individual innovativeness through ease of use on consumers' intention to adopt wireless technology via mobile devices. Hence, this study aims to determine the relationship between CI (II and DSI) and perceived ease of use in internet banking adoption. Therefore, the authors proposed hypotheses H₈ and H₉ as follows:

H₈: Innate innovativeness positively influences the perceived ease of use toward internet banking adoption.

H₉: Domain-specific innovativeness positively influences the perceived ease of use toward internet banking adoption.

11. Perceived risk

Perceived risk (PR), introduced by Bauer (1960), refers to the nature and amount of risk perceived by a consumer in contemplating a particular purchase decision. Previous studies indicate that PR is a major factor that negatively influences internet banking adoption. Roy et al. (2017) define PR as customers' subjective expectations related to the monetary and/or non-monetary loss associated with the use of internet banking for bank transactions.

Prior researchers agree that perceived risk is a multidimensional construct. Littler and Melanthiou (2006) identify six major facets of perceived risk (financial, performance, time, social, psychological, and security) associated with consumers' decisions to adopt internet banking services during the early stages of market development. Roy et al. (2017) categorised perceived risk into two dimensions: external and internal risks, based on the source of uncertainty or negative outcome. Kaur and Arora (2020) categorised perceived risk into six different groups: security, performance, financial, time, social, and psychological risk.

The perceived risk associated with online transactions may reduce the perceptions of behavioural and environmental control, and this lack of control is likely to negatively influence transaction intentions.

Perceived risk is expected to lower consumers' intentions to use websites for transactions. For example, consumers are unlikely to engage in online transactions with an e-retailer that is assumed to be opportunistic. Similarly, fears that an e-retailer has not taken adequate steps to reduce infrastructure-related risks negatively affects transaction intentions.

In the context of internet banking, Zhang and Hou (2017) found that perceived risk has a negative impact on the behavioural intention to use internet banking. Aldás-Manzano et al. (2009) provide new insights into CI traits as a useful predictor of online banking adoption. The study demonstrates that perceived risk is a key inhibitor of internet banking use and that CI reduces online banking risk perception. Innovators are more willing to adopt new ideas and cope with financial risk or a high degree of uncertainty arising from innovation adoption (Thakur & Srivastava, 2015).

In this study, the perceived risk of a consumer when using internet banking services in Vietnam expresses anxiety stemming from uncertainty when performing internet banking transactions.

Specifically, it is the fear of providing personal information or having their account information accessed by a third party. Therefore, we propose hypothesis H_{10} as follows:

H_{10} : Perceived risk negatively influences consumers' banking adoption.

12. Consumer innovativeness and perceived risk

Rogers et al. (1962) established a classification with five groups of adopters. Consumers who are the first to adopt an innovation are described as innovators. Rogers et al. (1962) maintains that innovators differ substantially from late adopters regarding their socio-economic characteristics (e.g., education, social status) and communicative behaviour (e.g., social participation, knowledge of innovations, exposure to the media), but, above all, their personal characteristics. Together with empathy and attitude toward change, these individuals demonstrate a greater propensity for risk-taking.

Aldás-Manzano et al. (2009) and Thakur and Srivastava (2015) identified the direct and negative effects of CI on perceived risk in online banking and e-retailing contexts, respectively. In general, online banking users experience a certain degree of uncertainty when they choose the internet as a distribution channel because of the complexity of financial services linked to the physical separation between the bank advisor and the consumer. Not all banking customers have the same risk-taking capacity and risk tolerance levels when they perform online financial transactions (Thakur & Srivastava, 2015). Therefore, the authors proposed hypotheses H_{11} and H_{12} as follows:

H_{11} : Innate innovativeness negatively influences the perceived risk toward adopting internet banking.

H_{12} : Domain-specific innovativeness negatively influences the perceived risk of adopting internet banking.

13. Internet experience

Internet experience is defined as the consumer's skill or ability gained by visiting several websites and using various value-added services offered on a broad range of websites, and not based on their experience with one particular website (Nysveen & Pedersen, 2004) as their general experience with internet usage, such as information from websites (Urumsah, 2015). Past experience of using the internet is known to be one of the key moderators of online behaviour (Hoffman & Novak, 1996). Users with more internet experience should be better able to exploit website offerings than inexperienced users. Experience plays an important facilitative role in technology adoption decisions (Alshamaila et al., 2013). Based on their experience with an innovation, a user can build greater knowledge of, and stronger beliefs about, the innovation, and can adopt it (Su et al., 2018). This suggests that increasing user experience makes users more capable of taking advantage of information technology innovation. Experienced internet users tend to have positive attitudes toward online activities (Kim, 2010). This may explain why websites that appear complicated to inexperienced users are easily navigated by users with significant internet experience. In the context of mobile payment adoption, Su et al. (2018) identified the positive effect of internet experience on mobile payment adoption. Internet experience has a positive effect on behavioural intention to adopt internet banking services (Lassar et al., 2005; Ozdemir et al., 2008; Polasik & Wisniewski, 2009). Based on the above discussion, the authors proposed hypothesis H_{13} as follows:

H_{13} : Internet experience positively influences the consumers' intention to adopt internet banking.

14. Materials and methods

14.1. Research process

This study combined qualitative and quantitative research methods. Qualitative research methods were applied for a focus group discussion. Krueger (1998) indicates that a focus group study is frequently used to design a questionnaire for a quantitative survey. In May 2020, the focus group discussion was conducted with 12 consumers in the meeting room of the University of Economics, Ho Chi Minh City. The aim was to modify the observational variables of the research concepts. Before the focus group discussions took place, it was confirmed in advance that respondents were 18 years old or above, to ensure that the contents of the interview were understood. Subsequently, the participants were asked to discuss a set of observational variables that could be used in quantitative research.

Based on these discussions, the researchers identified 29 items that could be used to measure the research concepts: PEU (4 items), PU (4 items), and attitude (4 items) were adopted from Cheng et al. (2006); PR (three items) and II (five items) were adopted from Chauhan et al. (2019); DSI (6 items) were adapted from Aldás-Manzano et al. (2009), while intention to use (three items) was adopted from Cheng et al. (2006). The observational variables of the research concepts used were originally written in English and translated into Vietnamese by a bilingual expert. Survey questionnaires in Vietnamese and English were used in this study.

To minimise response bias, a pilot survey was conducted to determine whether the respondents understood the statements used in the survey. The bilingual questionnaire was then used in a pilot test involving 80 respondents in June 2020. Based on the respondents' feedback, we modified the questionnaire to improve its readability and ensure its accuracy and appropriateness. Factor analysis was performed on the data collected from the pilot study. The test results were satisfactory, with seven factors corresponding to the seven intended constructs emerging with factor loadings ranging from 0.6 to 0.9. All Cronbach's alpha values surpassed the commonly adopted threshold value of 0.70.

The final questionnaire consisted of two sections: the first section dealt with personal information and demographic characteristics, and the second part of the questionnaire involved the research concepts. We collected data from bank customers in Vietnam who use internet banking for their transactions. Six bank brands were meticulously chosen, representing three types of banks in Vietnam: two Vietnamese state-owned banks (Bank for Investment and Development of Vietnam and Vietnam Bank for Agriculture and Rural Development), two Vietnamese private joint-stock commercial banks (Asia Commercial Bank and Dong A Bank), and two foreign bank branches (HSBC Vietnam and Citi Bank Vietnam). By employing a convenient sampling method, a quantitative survey was conducted through both face-to-face and email interviews. Each face-to-face interview took approximately 20 minutes, and the email interview five minutes, to complete. They were conducted by graduate students at the University of Economics, Ho Chi Minh City, who worked in these banks. A total of 1200 questionnaires were distributed. Finally, 621 questionnaires were collected over three months, from June to August 2020. After eliminating invalid incomplete questionnaires, a total of 475 completed questionnaires were used for further analysis. To test for non-response bias, face-to-face respondents were compared with email respondents, as suggested by Armstrong and Everton (1977). No significant differences were found in the mean responses for any of the constructs in the study, suggesting that non-response bias was not an issue in this study.

15. Data analysis

Cronbach's alpha reliability analysis and confirmatory factor analysis were used to assess the scale. Structural equation modelling was used to test the model and research hypotheses.

Table 1. Demographic characteristics

Demographic profile		Frequency (N = 475)	Percent (%)
Gender	Male	269	56.6
	Female	206	43.4
Experience	Non experience	151	31.8
	Experience	324	68.2
Age (in years)	Below 30	232	48.8
	30–40	153	32.2
	Above 40	90	18.9
Education level	Undergraduate	70	14.7
	Graduate	189	39.8
	Postgraduate	152	32.0
	Doctorate	64	13.5
Kind of banks	Vietnamese banks	321	67.6
	Foreign banks	154	32.4

16. Results

16.1. Description of research sample

The demographic characteristics of the respondents are summarised in [Table 1](#). Of the 475 respondents, 56.6% were male, 68.2% had internet experience, 48.8% were below 30, 32.2% were 31–40, and 18.9% were above 40 years old. Furthermore, 14.7% were undergraduates, 39.9% were graduates, 32% were postgraduates, and 13.5% were doctorates.

17. The results testing scale

The results presented in [Tables 2](#) illustrate that of the 29 observed variables used to measure the research concepts, only the DSI6 (I know about new online banking services before most other people in my circle do) observational variables did not meet the condition in testing scale. The remaining 28 variables satisfied the conditions of the reliability analysis: exploratory factor analysis and confirmatory factor analysis.

Construct reliability is measured using composite reliability. The value ranges from 0.805 to 0.898, which is above the recommended criteria of 0.6 and higher (Hair et al., 2010). Internal consistency among items of each construct is measured using Cronbach's α . The value of Cronbach's α is higher than 0.6, which is considered good for reliability/internal consistency between the items (Nunnally & Burnstein, 1994).

Convergent validity is measured using the standardized factor loading, average variance extracted. The standardized factor loading of all items range from 0.705 to 0.848, that is above the recommended criteria 0.5 (Hair et al., 2010). The value of variance extracted ranges from 0.565 to 0.689, that also satisfies the criterion of 0.5 and higher (Hair et al., 2010).

Furthermore, [Table 3](#) illustrates that the correlation between the constructs is less than 1 with $p < 0.05$, which ensures adequate discriminant validity (Hair et al., 2010).

Table 2. Constructs with items and reliability and validity

Constructs and items		SFL	CA	CR	AVE
Domain-Specific innovativeness (DSI)					
DSI1: In general, I am the first in my circle of friends to visit the new online banking services site when they appear on the banking website.	0.759	0.882	0.882	0.882	0.600
DSI2: If I heard that a new banking service was available on the web, I would be interested enough to trial it.	0.829				
DSI3: Compared to my friends I seek out a lot of information about online banking services.	0.731				
DSI4: In general, I am the first in my circle of friends to know of any new online banking services.	0.785				
DSI5: I would visit a new online banking service site even if in my circle of friends nobody has trialled it before.	0.765				
Innate innovativeness (II)					

(Continued)

Table 2. (Continued)

Constructs and items	SFL	CA	CR	AVE
II1: I am aware that I am the first people in my group to accept something new.	0.752	0.866	0.866	0.565
II2: I consider myself to be creative and original in my thinking and behavior.	0.784			
II3: I am an inventive kind of person.	0.783			
II4: I seek out new ways to do things.	0.732			
II5: I must see other people using new invention before I will consider them.	0.705			
Perceived usefulness (PU)				
PU1: Using the IB would enable me to accomplish my tasks more quickly.	0.871	0.898	0.898	0.689
PU2: Using the IB would make it easier for me to carry out my tasks.	0.791			
PU3: I would find the IB useful.	0.848			
PU4: Overall, I would find using the IB to be advantageous.	0.796			
Perceived ease of use (PEU)				

(Continued)

Table 2. (Continued)

Constructs and items		SFL	CA	CR	AVE
PEU1: Using the Internet Banking (IB) service is easy for me.		0.839	0.890	0.891	0.671
PEU2: I find my interaction with the IB services clear and understandable.		0.791			
PEU3: It is easy for me to become skillful in the use of the IB services.		0.848			
PEU4: Overall, I find the use of the IB services easy.		0.796			
Attitude (ATT)					
ATT1: Using the IB is a good idea		0.701	0.813	0.813	0.522
ATT2: I would feel that using the IB is pleasant		0.747			
ATT3: In my opinion, it would be desirable to use the IB		0.709			
ATT4: In my view, using the IB is a wise idea		0.731			
Perceived risk (PR)					
PR1: In my opinion there is a risk of fraud while using internet banking services		0.725	0.778	0.778	0.539
PR2: I am afraid to reveal my personal information while using internet banking services		0.738			
PR3: I am afraid that the third parties may access my account information when I use internet banking services		0.740			
Intention to use (IT)					

(Continued)

Table 2. (Continued)				
Constructs and items	SFL	CA	CR	AVE
IT1: I would use the IB for my banking needs	0.784	0.806	0.805	0.580
IT2: Using the IB for handling my banking transactions is something I would do	0.761			
IT3: I would see myself using the IB for handling my banking transactions	0.739			

Note: SFL: Standardized Factor Loading; CA: Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted.

Table 3. Results of test for discriminant validity

	DSI	II	PU	PEU	ATT	PR	IT
DSI	1						
II	0.301***	1					
PU	0.105***	0.109***	1				
PEU	0.119***	0.159***	0.086**	1			
ATT	0.144***	0.173***	0.073***	0.073***	1		
PR	−0.122***	−0.113***	−0.055***	−0.053***	−0.064***	1	
IT	0.342***	0.342***	0.166***	0.187***	0.179***	−0.148***	1

Note: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

Note: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level; Chi2 = 735.305; df = 365; Cmin/df = 2.015; TLI = 0.939; CFI = 0.945; RMSEA = 0.046

18. Result of common method bias

Common method bias (CMB) may result in bias between the observed and true relationships by either inflating or deflating the estimate. Thus, several procedural remedies were considered during the survey design and data collection to ensure that CMB did not affect the interpretation of the results. For example, we protected respondent anonymity, reduced evaluation apprehension, used verbal midpoints for measures, and reversed coded questions. Furthermore, Harman's single-factor test was used to check for CMB (Podsakoff et al., 2003). The first unrotated factor captured only 27.246% of the variance in the data. Therefore, these results suggested that CMB was not an issue in this study.

19. Results of model testing

We tested the proposed conceptual model (Figure 1) using structural equation modelling (SEM). The results indicated that the data fitted our conceptual model acceptably with $\chi^2 = 735.305$, $df = 365$, $Cmin/df = 2.015$, Tucker–Lewis fit index (TLI) = 0.939 (> 0.9), comparative fit index (CFI) = 0.945 (> 0.9), and root mean square error of approximation (RMSEA) = 0.046 (< 0.07) (Hair et al., 2010).

20. Results of hypothesis testing

The results of the estimated model presented in Table 4 indicate that the adoption of internet banking in Vietnam is directly affected by perceived usefulness, attitude, perceived risk, innate innovativeness, domain-specific innovativeness, and internet experience. Therefore, hypotheses H₂, H₅, H₆, H₇, H₁₀, and H₁₃ were supported. The results also illustrated that hypotheses H₁₁ and H₁₂ were supported, indicating that perceived risk is directly affected by innate and domain-specific innovativeness. These findings support the notion that perceived ease of use is directly affected by innate and domain-specific innovativeness. Therefore, there was support for the acceptance of H₈ and H₉. In addition, H₁ and H₃ were supported, revealing that consumers' attitudes are directly affected by perceived usefulness and perceived ease of use. Finally, perceived usefulness is directly affected by perceived ease of use. Therefore, there was support for the acceptance of H₄.

21. Results of impact of kind of banks on intentions to adopt internet banking

Upon conducting independent group t-tests, a significant ($p, 0.05$) difference was found between Vietnamese and foreign banks in terms of mean intentions to adopt internet banking scores (Table 5). Foreign bank customers had higher perceived intentions to adopt internet banking than those of Vietnamese banks.

Table 4. Results of Parameter estimates (AMOS report) of models

Hypothesis	Path		Standardized estimate	P	Results
H ₁	PU	→	ATT	***	Supported
H ₂	PU	→	IT	0.067	Supported
H ₃	PEU	→	ATT	***	Supported
H ₄	PEU	→	PU	0.032	Supported
H ₅	ATT	→	IT	***	Supported
H ₆	II	→	IT	***	Supported
H ₇	DSI	→	IT	***	Supported
H ₈	II	→	PEU	***	Supported
H ₉	DSI	→	PEU	0.032	Supported
H ₁₀	PR	→	IT	***	Supported
H ₁₁	II	→	PR	***	Supported
H ₁₂	DSI	→	PR	***	Supported
H ₁₃	EXP	→	IT	***	Supported

Note: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level.

Figure 1. Results of model testing.

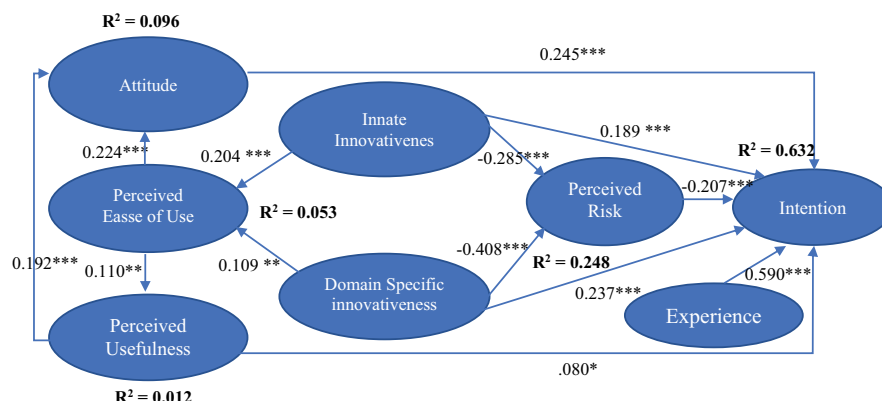


Table 5. The results of independent Group T-Tests Examining intentions to adopt internet banking by kind of banks

intentions to adopt internet banking	Kind of Banks				t	p
	Vietnamese banks		Foreign Banks			
	Mean	SD	Mean	SD		
meanIT	2.3946	0.80583	3.3377	0.70375	13.029	0.000

This study attempted to understand consumers' intentions to adopt internet banking in the Vietnamese context using the TAM and innovation model with an additional perceived risk construct.

The findings support that the intention to use online banking is directly affected by internet experience with $\beta = 0.590$ (This finding is supported by Lassar et al., 2005; Ozdemir et al., 2008; Polasik & Wisniewski, 2009), attitude with $\beta = 0.245$ (This finding is supported by Akturan and Tezcan 2012; Ayo et al., 2016), DSI with $\beta = 0.237$ (This finding is supported by Aldás-Manzano et al., 2009; Hirunyawipada & Paswan, 2006; Lassar et al., 2005 and; Thakur & Srivastava, 2015), perceived risk with $\beta = -0.207$ (This finding is supported by Zhang & Hou, 2017; Aldás-Manzano et al., 2009;; Thakur & Srivastava, 2015), II with $\beta = 0.189$ (This finding is supported by Chao et al., 2013; Chauhan et al., 2019;; Lassar et al., 2005), and perceived usefulness with $\beta = 0.080$ (This finding is supported by George, 2018; Kesharwani & Bisht, 2012; Maditinos et al., 2013;; Marakarkandy et al., 2017). These results suggest that when customers perceive the usefulness of internet banking, they exhibit a good attitude toward the service, thereby leading them to accept it. Furthermore, customers who are creative, easily accept the innovation, and have a special interest in internet banking, also intend to accept this service. Conversely, the fear of information disclosure and having their information accessed by a third party will reduce customers' intention to accept the use of internet banking. Finally, consumers with more internet experience should be better able to adopt internet banking services than inexperienced users.

The findings suggest a significantly negative impact of CI (II with $\beta = -0.285$ and DSI $\beta = -0.408$) on perceived risk. This result is similar to the findings of Aldás-Manzano et al. (2009) and Thakur and Srivastava (2015). It indicated that those who tend to be innovative will lead innovation compared to those around them, and those who have an interest in internet banking generally perceived less risk regarding the use of this service.

According to the study's findings, II with $\beta = 0.109$ and DSI with $\beta = 0.204$ were found to have a significant positive influence on perceived ease of use. This result is similar to those of Lu et al. (2005), Moore (1999), and Yi et al. (2006). This means that a consumer with a high creative personality and an interest in internet banking services will feel that using this service is easy and will tend to accept using internet banking services.

The findings suggest a significantly positive impact of perceived usefulness ($\beta = 0.192$) and perceived ease of use ($\beta = 0.224$) on consumers' attitudes. This finding is supported by George (2018), Kesharwani and Bisht (2012), Maditinos et al. (2013), and Marakarkandy et al. (2017). When customers feel that internet banking is useful and easy to operate, they will have a more positive view of internet banking and will more easily accept it.

Another important finding of the present study is that perceived usefulness is directly affected by perceived ease of use, with $\beta = 0.110$. This result is similar to that of George (2018), Kesharwani and Bisht (2012), and Marakarkandy et al. (2017). When customers feel that using internet banking is easy, they feel the benefits of using it. The convenience of using the service is a matter of great concern to customers.

22. Discussion and managerial implications

This study provides new insights into CI traits as a useful predictor of online banking service adoption. From a theoretical perspective, the main contribution of this research lies in providing a model that integrates the influence of CI traits, perceived risk, and demographic characteristics on internet banking service acceptance. Furthermore, the addition of these constructs to a TAM framework increases the predictive power of the theoretical framework.

To successfully market new products, marketers should realise the impacts of II and DSI on internet banking adoption and target some of their advertising campaigns toward more innovative users. Managers may want to develop a means by which they can nurture internet banking-related innovativeness among consumers. Marketers can create internet sites that facilitate and reward financial product comparisons (detailed and updated information regarding the characteristics of the financial products offered online and links to other sections/websites with additional information, such as news and expert reviews), thereby influencing internet users to become more domain-specific innovative. Consequently, this should lead them to increase their online financial transactions.

Additionally, perceived risk is found to be a significant predictor of internet banking adoption; it has been reported to have a significantly negative influence on consumers' intentions to use innovative technology. Banks should use advertisements, workshops, demos, and video presentations to try to increase internet banking awareness among consumer groups that are unaware of this service to encourage them to try it. For promotions, banks should also focus on one-to-one interactions and develop promotional plans and visual presentations to highlight the product's benefits. Moreover, it is important for banks to develop a communication program and advertisements to inform consumers about the robust security they provide, as doing so may decrease the PR and increase the assurance levels that current and potential customers have about security.

Our results also suggest that demographic characteristics, such as gender, income, education, and age, rather than measures of innovative predispositions, will help marketers segment consumers into innovators and later adopters.

23. Limitations and future research

As with any type of empirical research, this study has a few limitations that need to be addressed in future work. First, our study was conducted in a specific region (Ho Chi Minh City, Vietnam) that limits the generalisability of the findings. Second, the study measures internet banking adoption intentions, not actual usage or actual behaviour; thus, further studies can focus on consumers' actual adoption of internet banking in addition to their intention. Third, the researchers employed convenience sampling. Thus, the findings of this study may have biased results and limited generalisability. Future researchers may use a more representative sample to validate the findings of the present study. Fourth, the respondents in the present study are limited to the banking sector only, that may have hampered the generalisability of the findings. Thus, future researchers may extend this study to a broader sample comprising different sectors of the economy. Finally, online banking technology includes not only internet banking but also a variety of alternatives, from traditional automated teller machines (ATMs) to mobile banking, and the results can differ in these channels. Therefore, we propose, as a future line of research, the application of the model to a sample of users of ATMs and mobile banking services and a comparison of the results obtained.

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