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## **Understanding the moderating role of trust on continuance intention towards smartphone banking services: empirical evidence from Vietnam**

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**Abstract:** This study explores how trust moderates the relationships between performance expectancy, effort expectancy, social influence, innovativeness, and continuance intention toward smartphone banking services. Based on a unified theory of acceptance and use of technology (UTAUT) and incorporating a trusted perspective, this study proposes and validates a research model using convenience sampling ( $n = 518$ ) and a paper-based survey of

smartphone banking users in Vietnam. The SmartPLS4 package was utilised for data analysis. The research findings reveal that 1) performance expectancy, effort expectancy, social influence, and innovativeness significantly affect continuance intention, and 2) while trust moderates the relationships between effort expectancy and innovativeness with continuance intention, it has no impact on the link between social influence and continuance intention. The study enriches the information technology continuance literature by providing theoretical and managerial implications. Banks should focus on critical variables to maintain strong relationships and develop marketing strategies in the competitive financial sector.

**Keywords:** continuance intention; smartphone banking; UTAUT; trust; personal innovativeness; Vietnam.

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## 1 Introduction

Mobile commerce (m-commerce) and its transactional means of mobile payment (m-payment) are making substantial advances as a result of the swift growth of information technology (IT) systems, internet-mobile communications, and smartphones. Smartphone banking services (SBS) are mobile banking (m-banking) payments and

services performed through mobile applications on customers' smartphones (Susanto et al., 2016; Srivastava and Vishnani, 2021). To date, smartphone banking has emphasised a considerable role in engaging and benefitting user requirements for routine financial services (Poromatikul et al., 2020; Souiden et al., 2021; Thusi and Maduku, 2020). Researchers pointed SBS to various financial services performed by customers who have installed specific banking applications or platforms on their smartphones (Shaikh and Karjaluoto, 2015; Shaikh et al., 2023). Thus, by exploiting m-banking applications on smartphones, financial institutions and banks provide customers with widespread services such as money transfers, online payments, financial transactions, and checking account balances, everywhere and anytime (Naruetharadhol et al., 2021). While SBS, in which customers can use the banking service by accessing MB applications (or platforms) on smartphones, are dissimilar to conventional online banking and internet banking that are only used through online and/or web browsers (Filotto et al., 2021; Franque et al., 2022), smartphone banking is an umbrella term which is often used interchangeably with internet and online banking (Souiden et al., 2021; Shaikh et al., 2023).

While m-banking benefits both banks and customers by reducing costs, introducing new services and improving service quality in terms of convenience, time and place (Foroughi et al., 2019; Malaquias and Hwang, 2019; Abbasi et al., 2022), many consumers remain to stay with traditional automated teller machine (ATM) banking services because of perception of uncontrollability, lack of trust, privacy and security issues (Groß, 2016), or even several users tried SBS have churned back to online banking (Yang et al., 2015).

According to eMarketer report 2021, despite a high base due to the 2020 pandemic, retail mobile commerce will still grow at a steady 15.2% in 2021, and retail mobile commerce will double in size between now and 2025. More than 80% of mobile commerce retail sales will come from smartphones by 2021. By 2025, smartphone commerce will generate \$660.55 billion in revenue, equivalent to 90.7% of global retail e-commerce (Wurmser, 2022). With 688 million people, 8.56% of the world's population, Southeast Asia has many underbanked and unbanked populations, and smartphone accounts can help overcome challenges in getting cards and bank accounts (PwC, 2021). The digital banking market could potentially service 635 million internet users in ASEAN countries by 2028 (Statista, 2023). Despite the tremendous potential benefits for customers and banks, mobile banking users are lower than predicted (Shaikh et al., 2023).

Temasek, Google, and Baik and Company in their report e-Economy SEA 2022 stated that more than 60 % of Vietnamese adults over 15 had a financial account (Baijal et al., 2023). Most individuals in the country's urban areas have bank accounts, and there are around 120 million mobile phone subscribers, with the telecommunications network covering the whole nation; as a result, the number of individuals making smartphone banking in Vietnam is rising faster than in the rest of Southeast Asia, and the percentage of Vietnamese consumers using mobile wallets has risen from 37% in 2018 to 61% in 2022 (PwC, 2023). It encourages money transfers and purchases using mobile phone accounts for financial activities, which drives citizens away from cash use.

Prior scholars have studied m-banking from various perspective and theoretical frameworks (Franque et al., 2023; Shaikh et al., 2023). For example, scholars applied technology acceptance model (TAM) (Davis et al., 1989) examining user perceptions and attitude to intention towards m-banking (Mohammadi, 2015), expected-confirmation

model (ECM) (Bhattacharjee, 2001) predicting post-adoption usage of smartphone banking (Susanto et al., 2016), theory privacy calculus investigating customers' disclosure trade-off in m-payment (Khoa, 2021). While research on mobile banking has been considerate, its findings are mixed in terms of how authors selected theoretical views and banking service contexts (Tam and Oliveira, 2016). Surprisingly, little research was found in the m-banking literature on the perspective of the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003), a seminal theoretical base for customer behavioural changes (Thusi and Maduku, 2020). Moreover, while smartphone banking is a growing field (Sasongko et al., 2022; Baijal et al., 2022), publications on consumers' continuance intention to use SBS remain insufficient (Souiden et al., 2021). Up to now, users' continuance intention in m-banking in emerging context, such as Vietnam, is understudied (Van et al., 2020). In addition, far too little attention has been paid to the correlations between consumer trust, personal innovativeness and behavioural intention and post-adoption usage in the m-banking (Samsudeen et al., 2022; Wu and Ho, 2022).

Although smartphone banking, a set of innovative IT-enabled services, has abundant advantages and becomes widespread, its degree of acceptance is below expectations, and it is still in its early stages of growth. Customers are hesitant to embrace and may even be resistant to novel banking services (Foroughi et al., 2019; Susanto et al., 2016). While several studies have looked at customer responses in m-banking settings, there is limited research on the continuance intention (Poromatikul et al., 2020; Naruetharadhol et al., 2021). Moreover, there is a complete lack of empirical research on the impacts of user innovativeness on decision to utilise with the service (Shaikh et al., 2023; Ha et al., 2022), and unexpectedly, up to now very little research has been carried out to explore the importance of trust in the m-banking (Franque et al., 2021; Shaikh and Karjaluoto, 2015; Ha et al., 2022; Yan et al., 2021; Ashique Ali and Subramanian, 2022). Regrettably, while trust is regarded to an antecedent or independent variable forming continuance intention, very little attention has been paid to the role of trust as a moderator in m-banking services (Shaikh et al., 2023).

Acknowledging the need to fill these gaps in the IT continuance literature, this study makes an effort to take advantage of the UTAUT (Venkatesh et al., 2003) and integrates with the personal innovativeness and trust perspectives to investigate users' continuance intention to use smartphone banking in the Vietnam context. This research set out to explain three questions:

- 1 Which are the determinants of user continuance intention to use smartphone banking?
- 2 How do these determinants affect continuance intention?
- 3 How does trust moderate the relationships of continuance intention and its antecedents?

Our research makes several distinct contributions to the literature on continuance and mobile banking. Firstly, dissimilar to most earlier studies concentrating on initial phase of customers' usage of m-payment, this study inspected the continued usage intention of smartphone payment services by integrating the UTAUT, innovativeness, and trust perspectives. This study fills a gap in our body of knowledge of continuance intention of emerging IT-enabled services like m-payment during the post-adoption phase, which is vital to platform-based businesses (Franque et al., 2022). Secondly, this study has

generated fresh insight into the role of personal innovativeness in the context of increasingly prevalent and frequently utilised mobile banking services. To date, more investigation should be conducted to the customers' curiosity about cutting-edge technology and service, which, if discovered, may bring about practical recommendations for fruitful service offerings (Wang et al., 2022). Especially, in the fast-growing and fiercely competitive m-banking market of Vietnam, a nation with Asian culture, with a majority of young adults being online bank account holders, this investigation into user innovativeness has added a contextual contribution to mobile banking literature (Wang and Lee, 2020; Ruvio and Shoham, 2007). Thirdly, prior research has chiefly employed conventional theories, such as ECM (Bhattacharjee, 2001), expectation-confirmation theory (ECT) (Oliver, 1980), TAM (Davis et al., 1989), theory of planned behaviour (TPB), and diffusion of innovation theory (DIT) (Rogers, 1983), as fundamental views to explore users' behavioural changes within online contexts. Yet, smartphone users' behaviours may be not only influenced by their perceptions of performance and ease of use that underscores intention and actual usage, but also affected by social influence (SI) and individual characteristic of innovativeness. Thus, that the study has applied the UTAUT and innovativeness expanded the scope of the original UTAUT and highlighted the salience of innovativeness in foreseeing customers' decision-making towards SBS. Finally, and most significantly, this research has unveiled the role trust as a moderator in the context of online banking. Due to the fact that the original UTAUT disregards the impact of trust on customer responses in online environment, this study integrates trust for the first time as a moderating variable between consumers perceptions and their intention to continue using the online payment services (Yan et al., 2021; Vo et al., 2023). In addition, while the study has provided empirical evidence of the driving factors that impact continued intention towards SBS, it also suggests hands-on guiding principles for choosing a customer relationship and retention approach for managers in the banking sector.

The study has been structured as follows. The theoretical background review and hypotheses development are presented in the next section. This is followed by the methodology in Section 3. The key findings from data analysis of this research are in Section 4. The detailed discussion of the findings, implications and finally directions for future research are positioned in the last section.

## 2 Literature review

### 2.1 *Prior research on smartphone banking service acceptance and continuance*

In recent years, along with the rapid development of the app-based business model, the mobile banking literature has paid attention to smartphone users' acceptance of banking applications (Zhang et al., 2018; Tam and Oliveira, 2017). These new financial transaction systems can draw users away from traditional banks. Shaikh and Karjaluoto (2015) claimed that with smartphone banking apps, users can access financial services such as paying bills, checking account status and balances, transferring money and paying for a mobile recharge. Shahid et al. (2022) argued that convenience is the primary reason for the growing demand for smartphone banking applications (apps). While Tam and Oliveira (2016) based on task-technology fit (TTF) to examine the determinants of m-banking for individual performance, the authors stopped short in its initial adoption,

but not long-term usage. Similarly, Naruetharadhol et al. (2021) applied TAM and self-service technology quality to investigate user sustainable intention toward online banking. While having equated sustainable with continuance intention, the authors paid no attention on user characteristics (i.e., innovativeness), environment impacts (i.e., SI). However, consumers' usage of mobile banking may vary depending on their different perceptions of the benefits realised (Thusi and Maduku, 2020). Moreover, financial services are strictly associated to personal information, so users are also quite hesitant to use technology to disclose their private data (Gao et al., 2015). If users are confident about using technology, they should have confidence in the bank providing the service and trust in the partner receiving the benefits from the online financial transaction, they will accept it and intend to re-use it (Purohit et al., 2022). Despite its swift growth, a systematic understanding of how users make decisions to retain with SBS is still lacking (Bergmann et al., 2023; Purohit et al., 2022; Chauhan et al., 2022).

Furthermore, while the investment for implementation of IT-enabled service system to provide m-banking are enormous (Giovanis et al., 2019, Shaikh and Karjaluo, 2015), banks want customers not only to adopt use (i.e., experience, accept, initial use) but also to continue using their m-app services (Asnakew, 2020). Therefore, mobile application-based banks, both international or domestic, need to have effective measures to encourage customers to continue using the service if they want to increase users' smartphone banking usage. Studies of these significant challenges are needed to determine each banking technology's adoption and continued use accurately.

## 2.2 *The unified theory of acceptance and use of technology*

Scholars have employed widely TAM, TPB and DIT models to explore the factors of IS acceptance (Ha et al., 2022). The UTAUT was developed by Venkatesh et al. (2003) based on a systematic analysis of several essential technology adoption models to vanquish restrictions of current theories, namely, theory of reasoned action (TRA) (Fishbein and Ajzen, 1975), TPB, TAM, DIT, motivational model (Davis et al., 1992), the model of PC utilisation (MPCU) (Triandis, 1977), and social cognitive theory (SCT) (Bandura, 1986). The UTAUT went beyond TRA, TAM or TPB by including not only the two main cognitive beliefs in TAM, perceived usefulness (PU) and perceived ease of use (PEOU), but also affective beliefs SI and other control factors that impact behavioural intention and actual usage (Adapa et al., 2020). Accordingly, the UTAUT framework has employed a set of moderating variables (i.e., gender, age, user experience, and voluntariness) that improve its predicting strength as an 'unified' theory in IS field.

UTAUT has posited performance expectancy (PE), effort expectancy (EE), and SI as direct determinants of behavioural intention, together with facilitating conditions (FC) affect use behaviour. The PE is comparable to perception of usefulness and considered as a strong determinant of behavioural usage (Venkatesh et al., 2003, Singh, 2020). Also, while EE is similar to the PEOU of TAM, SI is comparable to subjective norm in TPB in the similar argument (Slade et al., 2015).

Although emerging as the most popular model for measuring consumer adoption of technology, TAM has been criticised for providing general information about individual opinions because of only two constructs: PU, PEOU, and companies' acceptance of such new technology. Because TAM was established in an organisational environment without fully considering individual user characteristics (Albashrawi and Motiwalla, 2019;

Marangunić and Granić, 2015) researchers implemented, modified, and expanded the model across multiple usage contexts.

TRA is a popular social-psychological theory, which advocates that an individual's behaviour is determined by their intention to perform that behaviour. In turn, the intention is then determined by an individual's attitude toward the behaviour and subjective norm. According to TRA, attitude reflects an individual's feelings towards a particular behaviour, and subjective norm indicates an individual's decision to perform that behaviour in the presence of social pressure. Ajzen (1991) added to TRA one more premise for the intention to use IS, which is cognitive behavioural control, to propose the TPB. In both theories, the antecedent of intention of use is the subjective norm, which is impacted by the individual's beliefs. According to Ajzen (1991), SN is people's belief that others who are important to them want them to act in a specific manner.

### 2.3 *Continuance intention*

Previous studies on financial-technology services have employed mainly theories to predict user adoption (Souiden et al., 2021; Tam and Oliveira, 2016). The ECM was proposed by Bhattacharjee (2001) to distinguish the difference between user acceptance (initial adoption) and continuance usage (post-adoption) (Yan et al., 2021; Ha et al., 2022). This model claims that user's intention to continue using an information system builds on three antecedents: PU, confirmation, and customer's satisfaction (Bhattacharjee, 2001).

The model included the PU construct to represent post-usage attitudes, and it relates to consumers' perceptions of the advantages of utilising a system, service, or technical tool. Confirmation refers to the user's perception of the constancy between their expectations of an information system and its performance that they get after using it (Foroughi et al., 2019). From the user's perspective, these perceptions are formed by confirming the user's initial expectations and post-use benefits to build a confirmation state on reusing the system. As a result, according to the ECM, confirmation has a significant effect on both the perceived usefulness of IS, and users' satisfaction (Yan et al., 2021). Satisfaction mentions to the level of emotional fulfilment of users when the information system applying matches their requirements and expectations (Bhattacharjee and Harris, 2009). Hsu et al. (2014) suggest that user satisfaction with using a technology device or service reinforces their intention to continue using it. User intent to continue using technology is a fundamental indicator of its success (Liao et al., 2007; Nguyen and Ha, 2022). For this reason, the measure of intention to continue to use is included in the model and is the target variable for predicting the actual behaviour of individuals.

Researchers have widely used ECM to test users' intention to continue using technology-based services, such as, fitness and health apps (Chiu et al., 2021), mobile banking (Foroughi et al., 2019), ride-hailing (Ha et al., 2022) and electronic money (Sasongko et al., 2022).

### 3 Proposed hypotheses and model

#### 3.1 Performance expectancy and its relationships

PE is described ‘as the degree to which an individual believes that applying the technology will help him or her to attain gains in job performance’ (Venkatesh et al., 2003). For smartphone context, PE has been considered as the degree to which customers employ a specific m-banking app on their smartphone. It represents customers perception of the usefulness or performance of using the installed m-bank app to utilise banking services, and enjoy relative advantages such as transaction speed, convenience, and instancy. Early studies have supported the positive impact of PE on behavioural intention in various mobile commerce contexts (Tam et al., 2018). A research by Alalwan et al. (2017) identified PE as a salient factor determining Jordanian customers’ behavioural intention to accept mobile banking. Additionally, PE has been confirmed as a considerable factor that influences the satisfaction and continued use of a technology (Yan et al., 2021). The PE – CI relationship has also been validated by previous empirical studies (Tam et al., 2018). Based on this and UTAUT’s hypotheses, it is anticipated that:

H1 PE positively affects continuance intention to use smartphone banking service.

#### 3.2 Effort expectancy and its relationships

Several definitions of EE have been proposed by researchers. Venkatesh et al. (2003) defined EE as ‘the extent of ease connected with the use of a system’. In the context of smartphone banking apps, ‘EE’ refers to the status to which users believe that mobile banking apps are easy to learn and require less effort to use. Several authors in the relevant area have validated the impact of EE on the customer’s intention to use online banking channels (Sánchez-Torres et al., 2018; Patil et al., 2020). Given this, the captured factors of EE (i.e., PEOU) have been verified by different mobile banking studies to have a crucial role in predicting customers’ intention to use mobile banking (Albashrawi et al., 2019; Alalwan et al., 2017).

EE has been used in IT continuance studies as a precursor of continuance intention, for example, Liao et al. (2007) in e-service, Tam et al. (2018) in mobile apps, Purohit et al. (2022) in mobile payment apps, and Marinković et al. (2020) in m-commerce. We argue that constant changes in digital technology and regulatory framework drive the smartphone banking system. Furthermore, in order to remain competitive, service providers frequently add and enhance services. This is likely to impact users’ perceptions of the simplicity with which the technology and its functions may be utilised, as well as the work necessary to understand them. Users will be satisfied and will continue to use the system if it is reasonably simple to use (Venkatesh et al., 2003). Earlier studies have established a beneficial relationship between EE and CI in the context of mobile financial services (Purohit et al., 2022; Patil et al., 2020). Therefore, it is proposed that:

H2 EE positively affects continuance intention to use smartphone banking service.

### 3.3 *Social influence and its relationships*

SI is defined by the UTAUT as “the extent to which an individual perceives that important others believe he or she should apply the new system” (Venkatesh et al., 2003). In the context of smartphone banking, ‘SI’ could be defined as the impact of a user’s social environment on user’s intention to continue using a mobile banking app, such as peer groups, relatives, opinionated leaders, friends, and colleagues (Zhou, 2011). In other words, the knowledge and encouragement offered by those around consumers may play a dynamic role in increasing customers’ awareness and willingness to use technology (Patil et al., 2020; Slade et al., 2015). Being a part of the social environment, an individual cannot ignore the influence of society on his life and decisions. In both the UTAUT and UTAUT2, Venkatesh et al. (2012, 2003) found SI to be a salient predictor of technology adoption intention. In addition, Indrawati and Putri (2018) also found a strong relationship between SI and behavioural intention. Moreover, the relationship of SI on CI has been examined in the context of mobile commerce (Marinković et al., 2020; Humbani and Wiese, 2019), e-learning (Cheng, 2021), and health apps (Chiu et al., 2021). Thus, concerning this research, the more the SI the higher the continued use of mobile payments. Therefore, it is proposed that:

H3 SI positively affects continuance intention to use smartphone banking service.

### 3.4 *Personal innovativeness (PI) and its relationship*

Drawing upon the diffusion of innovation theory, or DIT (Rogers, 1983), researchers claimed that personal innovativeness has been considered as the level of personal intention to accept any innovative technology (i.e., IT) or IT-enabled new services before other member of the same group or community (Goldsmith and Foxall, 2003). In several studies conducted in various service contexts, it has been described that users with high innovativeness are prone to be attracted more to high-tech services and products and use innovative technology (Kim et al., 2017). Chiu et al. (2019) investigate the relationship of personal innovativeness and continuance intention toward mobile travel service system in tourism sector. In mobile commerce, there are quite a few studies examining personal innovativeness and its interactions with CI, such as the works of Prenaj et al. (2023) in m-commerce, and Fauzi and Sheng (2021) in ride-hailing service, of Lee et al. (2021) and Mohammadi (2015) in mobile banking, to name a few. For Vietnam context, a nation with Asian culture, innovativeness has been considered a crucial consumers’ characteristic in IT research (Ruvio and Shoham, 2007; Wang et al., 2022). IT continuance and adoption literature has argued that personal innovativeness is an influencer of consumer behaviour adoption and intention in m-banking and m-commerce general (Elhajjar and Ouaida, 2020; Rahmi and Handayani, 2023). Accordingly, for this research context, the following is hypothesised:

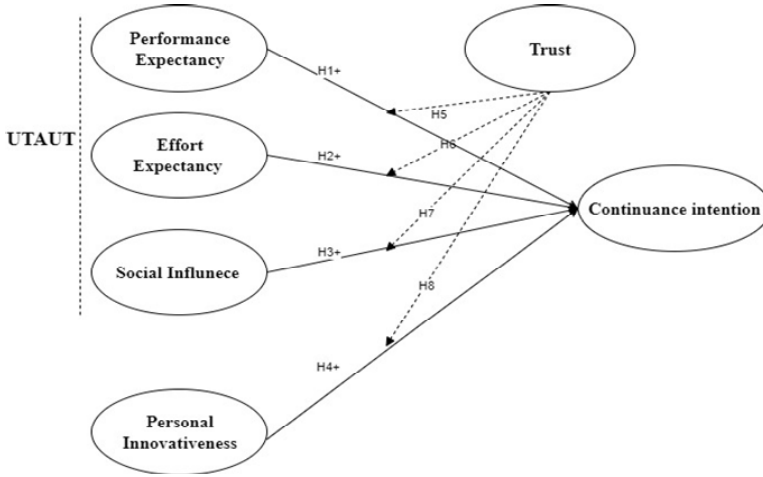
H4 Personal innovativeness positively affects continuance intention to use smartphone banking service.

### 3.5 Trust

Trust is mentioned in many different contexts and has various definitions, reflecting the meaningful nature of trust (Soleimani, 2022). One of the most acceptable definitions in the marketing and IT literature of trust is proposed by Mayer et al. (1995), who claimed that trust is being understood as ‘the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party’ (Mayer et al., 1995). In e-commerce environment, researchers argued that trust helps users overcome their perception of risk and unwillingness and users likely conduct the following actions: accepting recommendations from e-commerce vendors, sharing information online, and, most importantly, purchasing from the e-commerce applications (Faqih, 2022). Trust is regarded to consist of three belief components, including ability, integrity, and benevolence (Nguyen and Ha, 2021; Gao et al., 2015). While ability means that m-commerce providers have the knowledge and skills to accomplish their duties, integrity means that they maintain their commitments and do not betray consumers and benevolence is that online commerce businesses prioritise and care consumers’ benefits, not just their own. In mobile payment, scholars claimed that trust is the belief which encourages online buyers to willingly become vulnerable to the online vendors after knowing about the characteristics of the vendors from which they are buying (Al-Adwan et al., 2020; Olaleye et al., 2019). Also, in m-commerce, Wei et al. (2009) denoted that trust as “the extent to which an individual believes that using m-commerce is secure and has no privacy threats” (Sasongko et al., 2022). Recently, Sasongko et al. (2022) referred to trust as the willingness of users to take risks caused by the transactions of another party (i.e., banks), believing on the expectation that the bank takes beneficial action in favour of bank users. Researcher also considered trust as an essential direct influencer of continuance intention in online shopping context and mobile payment settings (Poromatikul et al., 2020). Drawing on the previous studies, trust is the belief in our study which enables users to participate in m-banking service voluntarily, while taking into account its susceptible interactive features. Given the m-banking nature (e.g., mixed online-offline interaction, virtual payment patterns) users may experience uncertainty or frustration caused by m-banking service, third-party online payment systems and other relevant parties including internet networks and the mobile service providers. Trust likely reduces user perception of risk and reluctance and encourages user initial usage (i.e., pre-adoption), enables users to make use m-banking services and leads to continuance usage (Nguyen and Ha, 2022; KA and Subramanian, 2022). While trust has been examined as a moderator in a limited contexts such as human resource (Boadi et al., 2022), online hospitality (Han et al., 2023), e-government (Lee and Kim, 2022), very few explored its moderating role in financial sector such as mobile banking (KA and Subramanian, 2022). For e-wallet service, Senali et al. (2022) have examined the moderating role of trust on the relationships between users’ perceptions of the service (e.g., PU) on intentions to use. Chong et al. (2023) and Nguyen and Dao (2024) have investigated trust as a moderator of continuance intention for e-commerce context in Malaysia and Vietnam, respectively. As such, based on previous studies, in this study context, we propose that:

- H5, H6, H7, H8 Trust moderates the relationships between PE, EE, SI, personal innovativeness and users’ continuance intention in using smartphone banking service.

**Figure 1** Research model



## 4 Research methodology

### 4.1 Data collection and sample

A questionnaire-based survey was done with smartphone banking service customers in three of Vietnam's biggest megacities: Hanoi, Ho Chi Minh City, and Danang (World Population Review, 2022). The SBS respondents from the five largest banks in Vietnam, including Vietcombank, Vietinbank, Tienphongbank, Sacombank and Techcombank (Vietnam Credit, 2021). These are commercial banks with the following criteria:

- 1 nationwide branches located in remote areas and metropolitans
- 2 providing a wide range of services
- 3 a diverse customer base.

Another criterion for selection is that the banks get complete autonomy in doing business activities, unlike state banks (e.g., Bank of social policies), which depend on the direction of the government. Participants were selected on three conditions:

- 1 being a smartphone banking account holder
- 2 having the banking app downloaded and operating on their smartphones
- 3 having experience in using at least one m-banking service, such as mobile payment for bills and fund transfers (Shaikh et al., 2023).

The pre-test for questionnaire items was also conducted through group discussions with ten ( $n = 10$ ) bank officials, financial experts, banking and management information system specialists, and m-banking users in order to determine whether any items in the questionnaire employed unusual language or wording (Colton and Covert, 2007).

There are three parts in final questionnaire. The first section shows a screening questions part and a brief explanation on mobile banking services. The second one

comprised 23 observed items, and last component intended to gather the participants' demographic details. A total of 600 questionnaires were conducted via convenience and snowball sampling methods, which were deemed appropriate given the context of our research model involving a novel e-services (e.g., smartphone banking) and the challenge of limited business data availability in an emerging market as Vietnam (Calder et al., 1981; Sarstedt et al., 2017; Ha, 2022). The data was gathered mostly through face-to-face interviews between January and March 2023 since many respondents indicated on the day of the interview that they may fill up later and send using electronic means. Of the 600 given surveys, 518 were completed and valid, accounting for 86.3%. Although information about participants' residences is absent in the survey, statistical analysis unveils that the largest share of respondents originates from Ho Chi Minh City (HCMC), totalling 209 individuals and accounting for 40% of the sample, slightly surpassing Hanoi's contribution of 183 respondents (35%), while the smallest contingent hails from Danang, comprising 126 respondents and constituting 25% of the surveyed population. Before conducting the interviews, a group of senior banking and financial management students were educated on survey techniques (e.g., preserving the questionnaire's order and not rephrasing items) to prevent response bias. During the recruiting process, respondents were advised that the interview was optional, and their replies were kept secret. The respondents were asked to tick the consent box before an interview. These steps are taken to ensure the quality of the face-to-face interviews and data collection process (Holbrook et al., 2003; De Leeuw et al., 2012).

**Table 1** The participants' demographic profile

|                | <i>Factor</i>                 | <i>Frequency</i> | <i>Percentage (%)</i> |
|----------------|-------------------------------|------------------|-----------------------|
| Gender         | Male                          | 249              | 48%                   |
|                | Female                        | 269              | 52%                   |
| Age (years)    | 18–23                         | 93               | 18%                   |
|                | 24–45                         | 197              | 35%                   |
|                | > 45                          | 228              | 47%                   |
| Education      | College and University degree | 93               | 18%                   |
|                | High-school degree            | 228              | 47%                   |
|                | Other                         | 197              | 35%                   |
| Position       | Senior manager                | 78               | 15%                   |
|                | Middle manager                | 192              | 37%                   |
|                | Staff                         | 248              | 48%                   |
| Monthly income | Below \$430                   | 93               | 18%                   |
|                | \$430–\$870                   | 78               | 15%                   |
|                | \$871–\$1,500                 | 145              | 28%                   |
|                | Above \$1,500                 | 202              | 39%                   |

*Source:* Authors' calculation

The demographics of the participants (Table 1) were divided into five dimensions (gender, age, education, position, and monthly income). Our primary focus in this study is the sample of users using online banking on a smartphone application. The data shows that most respondents are women (52%), full-time workers (47%), and over 45 years old.

There were 197 participants aged 24 to 45, accounting for 35%. The remaining 18% of the participants were students between the ages of 18 and 24. The median monthly income of most respondents (39%) was above \$15,00, followed by 28% with an income between \$871–\$1,500.

The study sample size is 518, which is larger than ‘ten times the largest number of structural paths directed at a particular latent construct in the model’ (Hair et al., 2011). As presented in Figure 1, our research model consists of four paths (from PE, EE, SI, and PI) that connect to dependent variable of CI, suggesting that a number of samples of above 40 should be used. Therefore, our study’s total of 518 responses fulfils the PLS-SEM minimum sample size condition (Shmueli et al., 2019; Hair et al., 2019).

## 4.2 *Measurement scale*

This study measures items using a Likert scale with seven points ranging from strongly disagree (1) to strongly agree (7). The seven-point Likert scale is considered as a measurement with a relatively high degree of precision and simplicity (Nunnally, 1978). Measurements sourced from prior literature were gathered and adapted to ensure content validity, with each scale chosen from widely used options and pertinent contextual scales (Trochim et al., 2016). The scales for continuance intention using three items modified from Bhattacharjee (2001) and Baabdullah et al. (2019). The five others for EE, PE, personal innovativeness, SI, and trust are measured in four items for each construct. All of EE, PE and SI dimensions are taken from Venkatesh et al. (2003). The personal innovativeness scale is modified from (Mohammadi, 2015) and (Chiu et al., 2019). The scale for trust is adapted from Gefen et al. (2003) and Gao et al. (2015).

## 5 **Results**

### 5.1 *Common method bias*

Because we employed a self-reported questionnaire to measure the variables, the following statistical analyses are required to identify common method bias (CMB). First, we employed Harman’s one-factor test to identify CMB concerns. The results revealed that the first component accounted for 20.514% of the total variation, which was smaller than the 50% threshold for (Podsakoff et al., 2003). In other results from PLS report, variance inflation factor (VIF) figures were less than 3.3, with the value recorded from 1.063 to 2.477, thus providing further evidence the model was free of CMB (Kock, 2015). Besides, all the inner VIF data were less than 5.00; the indicated critical benchmark (Hair et al., 2011) showed no multicollinear correlation between the variables. In conclusion, findings from two test methods showed this research was not affected by CMB.

### 5.2 *Assessment of the outer measurement model*

According to Kline (2015) and Hair et al. (2018), researchers employed internal consistency reliability (Cronbach’s alpha), composite reliability (CR), average variance extracted (AVE), and factor loading as statistical evidence to calculate the reliability and validity of the outer model. As seen in Table 2, all Cronbach’s alpha values are higher

than 0.70, ranging from 0.721 for trust to 0.833 for personal innovativeness. Similarly, the CR for all latent constructs ranged from 0.740 for trust to 0.835 for personal innovativeness; all of these values were greater than 0.70 for their respective levels. Additionally, convergent validity was assessed by determining whether or not the AVE values were greater than 0.5, and the minimum of AVE was 0.532, demonstrating that the scale's reliability and validity was confirmed.

When evaluating reliability, most of the factors have a standardised factor loading (SFL) value greater than 0.709, with the exception of one indicator of social influence (SI4) and two items of trust (TR1, TR3) have results of 0.658, 0.691, and 0.691, respectively. In this case, Chin et al. (1997) considered that the loading factor of all items above the cut-off threshold of 0.6 and above is also acceptable. Therefore, all observed variables in this study are kept, and the scale ensures adequate reliability.

**Table 2** Constructs and their responding measures

| <i>Constructs</i>            | <i>Items</i> | <i>Loading</i> | <i>Cronbach's alpha</i> | <i>Composite reliability (rho_a)</i> | <i>Composite reliability (rho_c)</i> | <i>Average variance extracted (AVE)</i> |
|------------------------------|--------------|----------------|-------------------------|--------------------------------------|--------------------------------------|-----------------------------------------|
| Effort expectancy (EE)       | EE1          | 0.816          | 0.790                   | 0.795                                | 0.864                                | 0.614                                   |
|                              | EE2          | 0.786          |                         |                                      |                                      |                                         |
|                              | EE3          | 0.729          |                         |                                      |                                      |                                         |
|                              | EE4          | 0.799          |                         |                                      |                                      |                                         |
| Performance expectancy (PE)  | PE1          | 0.783          | 0.775                   | 0.786                                | 0.855                                | 0.596                                   |
|                              | PE2          | 0.814          |                         |                                      |                                      |                                         |
|                              | PE3          | 0.753          |                         |                                      |                                      |                                         |
|                              | PE4          | 0.736          |                         |                                      |                                      |                                         |
| Personal innovativeness (PI) | PI1          | 0.751          | 0.833                   | 0.835                                | 0.889                                | 0.668                                   |
|                              | PI2          | 0.806          |                         |                                      |                                      |                                         |
|                              | PI3          | 0.878          |                         |                                      |                                      |                                         |
|                              | PI4          | 0.830          |                         |                                      |                                      |                                         |
| Social influence (SI)        | SI1          | 0.828          | 0.773                   | 0.805                                | 0.853                                | 0.593                                   |
|                              | SI2          | 0.841          |                         |                                      |                                      |                                         |
|                              | SI3          | 0.740          |                         |                                      |                                      |                                         |
|                              | SI4          | 0.658          |                         |                                      |                                      |                                         |
| Continuance intention (CI)   | CI1          | 0.810          | 0.775                   | 0.786                                | 0.870                                | 0.690                                   |
|                              | CI2          | 0.876          |                         |                                      |                                      |                                         |
|                              | CI3          | 0.805          |                         |                                      |                                      |                                         |
| Trust (TR)                   | TR1          | 0.691          | 0.721                   | 0.740                                | 0.819                                | 0.532                                   |
|                              | TR2          | 0.777          |                         |                                      |                                      |                                         |
|                              | TR3          | 0.692          |                         |                                      |                                      |                                         |
|                              | TR4          | 0.754          |                         |                                      |                                      |                                         |

*Source:* Authors' calculation

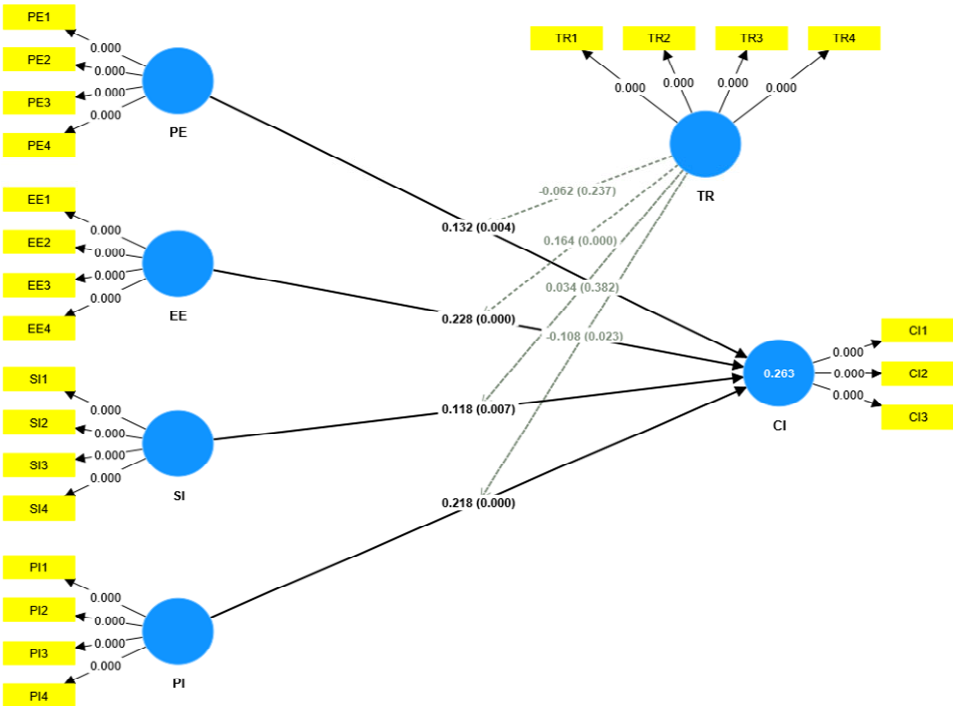
On the other hand, some scholars used the heterotrait–monotrait ratio of correlations (HTMT) to assess discriminant validity, ensuring that HTMT values should be below 0.85 (Kline, 2015; Hair et al., 2019). Therefore, as the test displays that all HTMT values are less than 0.85, this demonstrates that discriminant validity has been gained and that the constructs of the research’s model are reliable and valid. The HTMT results can be seen in Table 3.

**Table 3** Results of discriminant validity using HTMT

|         | <i>CI</i> | <i>EE</i> | <i>PE</i> | <i>PI</i> | <i>SI</i> | <i>TR</i> | <i>TR x SI</i> | <i>TR x PI</i> |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|----------------|
| CI      |           |           |           |           |           |           |                |                |
| EE      | 0.441     |           |           |           |           |           |                |                |
| PE      | 0.402     | 0.397     |           |           |           |           |                |                |
| PI      | 0.346     | 0.295     | 0.409     |           |           |           |                |                |
| SI      | 0.416     | 0.255     | 0.419     | 0.351     |           |           |                |                |
| TR      | 0.286     | 0.274     | 0.318     | 0.403     | 0.419     |           |                |                |
| TR x SI | 0.075     | 0.081     | 0.141     | 0.127     | 0.182     | 0.215     |                |                |
| TR x PI | 0.111     | 0.087     | 0.159     | 0.061     | 0.129     | 0.138     | 0.461          |                |
| TR x EE | 0.200     | 0.122     | 0.123     | 0.083     | 0.077     | 0.074     | 0.415          | 0.422          |

*Source:* Author’s calculation

**Figure 2** SmartPLS results (see online version for colours)



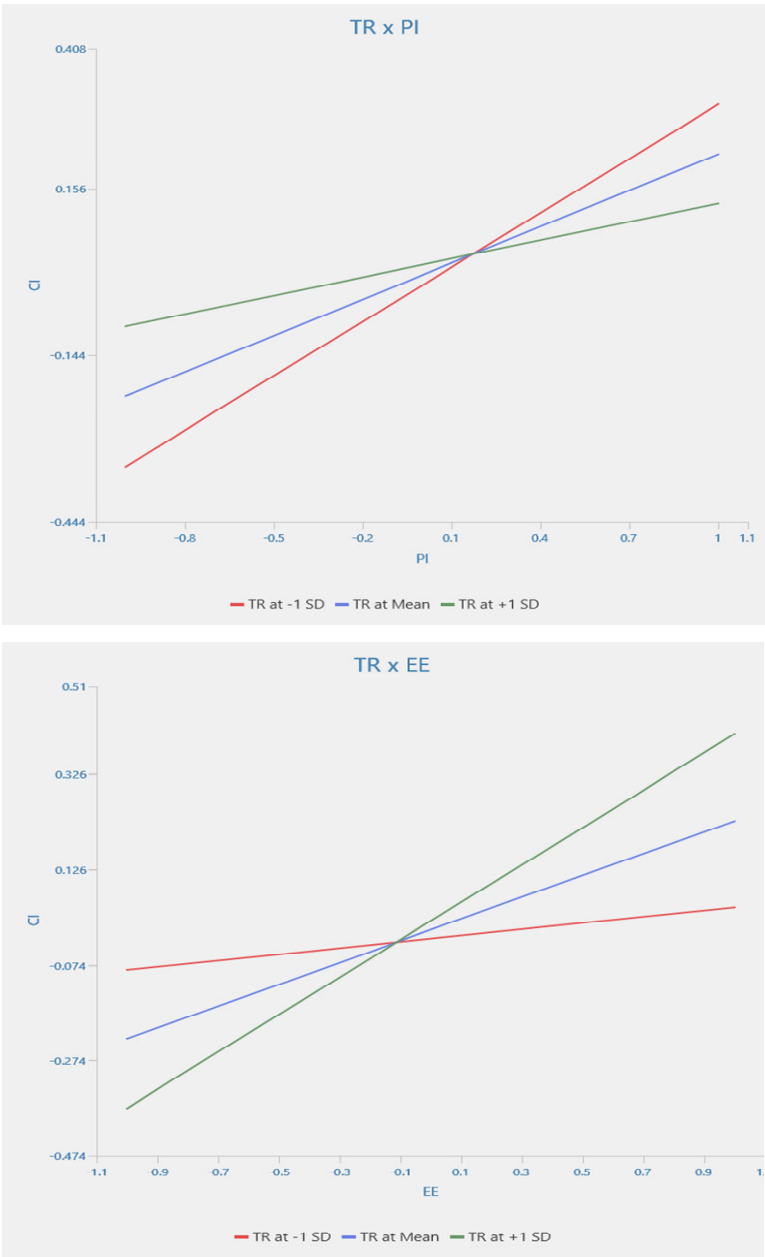
*Source:* SmartPLS results

**Table 4** Bootstrapping results

|   | Path coefficient | Observed T-statistics | Standard deviation | Effect size ( $f^2$ ) | Bias   | Confidence intervals (2.5%) | Confidence intervals (97.5%) | P value | Results       |
|---|------------------|-----------------------|--------------------|-----------------------|--------|-----------------------------|------------------------------|---------|---------------|
| 1 | PE → CI          | 2.881                 | 0.046              | 0.018                 | 0.002  | 0.041                       | 0.22                         | 0.004   | Supported     |
| 2 | EE → CI          | 5.297                 | 0.043              | 0.059                 | 0.001  | 0.138                       | 0.308                        | 0.000   | Supported     |
| 3 | SI → CI          | 2.709                 | 0.043              | 0.048                 | 0.001  | 0.033                       | 0.204                        | 0.007   | Supported     |
| 4 | PI → CI          | 4.967                 | 0.044              | 0.013                 | 0.001  | 0.133                       | 0.303                        | 0.000   | Supported     |
| 5 | TR x PE → CI     | 1.182                 | 0.052              | 0.003                 | -0.003 | -0.161                      | 0.045                        | 0.237   | Not supported |
| 6 | TR x EE → CI     | 4.013                 | 0.041              | 0.026                 | -0.002 | 0.087                       | 0.245                        | 0.000   | Supported     |
| 7 | TR x SI → CI     | 0.874                 | 0.039              | 0.008                 | 0.000  | -0.042                      | 0.112                        | 0.382   | Not supported |
| 8 | TR x PI → CI     | 2.277                 | 0.047              | 0.000                 | 0.004  | -0.206                      | -0.022                       | 0.023   | Supported     |

Source: Authors' calculation

**Figure 3** Moderating effects of trust (see online version for colours)



Source: SmartPLS results

### 5.3 Assessment of the structural inner model

Because the prediction and explanation of latent constructs in partial least squares (PLS) structural equation modelling (SEM) (PLS-SEM) contribute to the main purpose of this

study, PLS-SEM with the SmartPLS 4 software, version 4.0.8.3 is used to analysis the aforementioned assumptions (Hair et al., 2019). During this step, the direct hypotheses and moderating relationships were examined.

Table 4 shows bootstrapping calculations, including the coefficient of determination (R-squared), t-statistics, and p-value, the criteria evaluated to determine the significance of path coefficients. Along the line of Table 4, Figure 2 depicts the path coefficients and R-squared for all variables.

For more details, the R-squared data of four direct relationships ranged between 0.000 and 0.007, hypothesis 1 to hypothesis 4 were supported, meaning that EE, PE, personal innovativeness and SI have positive influences on continuance intention.

For the moderating effect testing, as shown in the simple slope analysis in Figure 3, the SmartPLS4 report supports only two of the four moderating hypotheses, where trust significantly and positively moderates the relationship between EE and CI (H6,  $p = 0.000$ ) and successfully moderates the relationship between PI and CI (H8,  $p = 0.023$ ). Trust, on the other hand, failed to modify the links between PE and CI (H5,  $p = 0.237$ ), SI and CI (H7,  $p = 0.382$ ), therefore H5 and H7 were not supported.

## **6 Discussion and implication**

### *6.1 Discussion*

Numerous researches have looked at the factors that led to users' initial adoption of mobile payment systems. Very little research, meanwhile, has examined post-adoption behaviour concerning smartphone-enabled services and the moderating role of trust on the links toward users' continuance intention to use online banking. The current study filled this knowledge gap by examining continuance intention toward mobile payment systems using a theoretical framework integrating the UTAUT, innovativeness, and trust perspectives.

This study combined three UTAUT's variables (i.e., PE, EE and SI) with two essential variables of personal innovativeness and trust. The findings exhibited strong empirical backing for predicting users' continuance intention to towards SBS. Accordingly, three constructs, including PE, EE, and SI, were reaffirmed as antecedents of continued usage intention. As displayed in Figure 2, hypotheses H1 ( $p = 0.004$ ), H2 ( $p = 0.000$ ), and H3 ( $p = 0.007$ ) are all confirmed. Our findings are aligned with the works of previous studies (e.g., Marinković and Kalinić, 2020; Amoroso and Chen, 2017). As such, users of smartphone banking are driven to go using the services when they approve the performance of SBS and its effortless use. In practice, consumers make decision to stay with SBS only when they realise its usefulness, easy of use and get encouraged from their important peoples (Susanto et al., 2016). Therefore, designing user-friendly and intelligible application of SBSs are essential for customers (Abdullah et al., 2020). Online banking customers would find an SBS easy to use because this simplification will facilitate them to get accustomed with the features and utilities provided. Further, the confirmation of impact of SI on CI implies that, during customers' usage of SBS, they may change their perceptions about the usefulness of SBS by observing how peers utilise the application and services, and then decide to make decisions of continued usage (Alsyounf and Ishak, 2018).

In addition, that H4 was found significant ( $p = 0.000$ ) implies personal innovativeness has also been identified as a driving factor of CI toward SBS. The findings is in line with those of Lu (2014), Patil et al. (2020) in the comparable contexts and indicate a strong correlation between elevated innovation propensity among customers and their propensity to be early adopters of novel smartphone models and online banking applications. This pattern aligns seamlessly with the prevailing trend wherein the predominant users of smartphone-based banking services comprise individuals engaged in demanding professions accompanied by relatively substantial incomes, enabling swift integration of technology into their work and personal lives (Senali et al., 2022). This finding, which is attribute to customers' strong curiosity, self-confidence, and tolerance for risk, is supported by previous studies (e.g., Foroughi et al., 2024).

Moreover, whereas earlier studies often focused on trust as an antecedent directly affecting CI (Jiang and Lau, 2021; Nguyen and Ha, 2021), our findings indicate that trust has moderating effects on the relationships between EE and personal innovativeness with continuance intention. First, the positively moderating influence of trust on the link EE-CI (H6 is significant,  $p = 0.0000$ ) is the first empirical evidence that went beyond the conservative recognition of direct role that trust plays on consumers' behaviour within mobile commerce context (Lankton et al., 2015; Siegrist, 2021; Kim and Peterson, 2017). As Figure 3 displays, the slope of the line, representing the moderating effect of TR on the relationship between EE and CI, is greater for a stronger TR as compared with a weaker TR. So, for a higher TR, the association between EE and CI is stronger and vice versa. Next, as presented in Figure 4, when trust is low, the role of PI increases and should be high for users to have positive continuance intention. Moreover, as the strength of trust becomes higher, the influence of PI is reduced and its impact on CI becomes less significant (H8 is negatively significant). This also implies that a high level of trust may alleviate the negative influence of low PI on users' usage of SBS. The finding reveals that trust in SBS is extremely imperative and guides bank managers and policymakers in improving trust, security and privacy issue in the financial sectors. This result can be explained by the fact that our research is carried out within the context smartphone payment platform in Vietnam where trust might be regarded as more important than personal characteristic of innovativeness in using financial services.

## 6.2 *Theoretical implications*

The current study contributes to online payment literature by critically considering the explanation of the broadened model of UTAUT incorporating with innovativeness and trust perspectives on continuance intention of using SBS. Moreover, this study examines the moderating effect of trust on the relationships between UTAUT's factors and continuance intention. First, this research has expanded the UTAUT scope by importing trust as a moderator in the context of online banking. Due to the fact that the UTAUT theory disregards the impact of trust on customer responses, this study integrates trust for the first time as a moderating variable between consumers perceptions and their intention to continue using the online payment services. Second, the study contributes to customer behaviour literature by including a personal characteristic of innovativeness into the UTAUT framework to predict customer post-adoptive usage. This is the first to offer a comprehensive insight of the implications of personal innovativeness on continuance intention by employing UTAUT to how consumers maintain using smartphone payment. As such, the extended UTAUT has formed a research model first to provide empirical

evidence explaining post-adoption behaviour pertaining to mobile payment context. Extant research has suggested that extending the scope of the initial UTAUT models by applying them in diverse perspectives, to different new technologies, and with additional constructs, will fortify the explanatory strength of the theory (Lee et al., 2023; Aytekin et al., 2022). Third, while the UTAUT model has widely been utilised in prior studies investigate user IT acceptance, this study is among the first to show that the UTAUT model can be extended to post-adoption behaviour towards emerging IT-enabled services, such as those for online payments (Cao and Niu, 2019). Additionally, the majority of prior research on post-adoption usage towards SBS have been conducted in developed context of western nations and China (Cao et al., 2018; Tam and Oliveira, 2016). This study was performed differently, in an emerging socioeconomic context of Vietnam, in that way providing insights in the existing literature on online payment.

### *6.3 Managerial implications*

Findings from this study have several applications. First, mobile banking managers can take advantage of the post-adoption mechanism of forming continuance intention that have been identified as being crucial in order to facilitate the growth of mobile payment systems. The empirical findings show that customers are driven to maintain using their smartphone payment services by their expectancy of performance and effortless of SBS, perception of the influence of important people, and individual innovativeness. It suggests that payment service providers should focus on streamlining their service delivery procedures to retain their customers and compete in the fiercely competitive mobile payment market. Also, service providers should promote various new services and discounts to attract customers from other service businesses.

Second, the results also discovered that in the post-adoption stage, customers give substantial status on PE and EE factors. Accordingly, payment service designers who generate smartphone payment platforms should develop and provide plain, truthful, user-friendly features and interfaces to underline the usability of mobile payment services. Moreover, service managers should advance promotional strategies to enhance awareness and perception on payment apps among customers.

Third, the significant outcome of the research germane to managers is the implication of trust. To gain customers' trust on SBS, payment managers should introduce suitable security procedures and measures, as well as customer privacy protection. Regarding this issue, SBS providers should regard trust in a multidimensional approach and progressive way including trust building, trust stabilisation, and trust recapturing to sustain customers' trust on the SBS. The data analysis indicates that continuance intention to use the SBS is tightly associated with system security and individual privacy. Once customers expect and satisfy the service's security and level of privacy, they will improve their belief in SBS and decide to stay with the service. Thus, the SBS providers must enhance trust, security, and privacy to guarantee and persuade customers to use the SBS service. When key customers are satisfied with the service, their influence (i.e., SI) will be strong and promote continued use, including attracting new customers.

## 7 Conclusions

In this highly competitive financial sector, banks must maintain valuable customer relationships and ensure that customers continue to use their mobile banking services. The research reveals several key factors important to users' continuance usage. These are PE, EE, SI, innovativeness, and trust. Our study especially showed that trust moderates the relationships between EE and innovativeness with continuance intention but has no influence on the effect of SI on users' continuance intention.

### 7.1 Limitations and future research

The present work has some unavoidable limitations that have the room for future research to explore. The first limitation is that the sampling technique was convenience and the sample was strained from big cities, so upcoming investigations could sample larger in both municipal and remote areas. Future research may also investigate more diverse type of banks, for example, Bank for social policies (focus on rural and highland provinces, and low-income customers), to improve the generalisability. Second limitation is that this study employed self-reported data from survey. While most of the studies consider continuance intention (not actual usage) as dependent variable. Future research may examine CI by collecting computer-recorded to expand the scope and ensure the study's validity.

Moreover, future studies can employ random sampling approach to be more secure in terms of generalising the results. Another restriction of the study is that innovativeness factor was included in the theoretical model as antecedent of CI. Future research could explore personal innovativeness and other potential factors (e.g., habit, adaptation) as mediators of CI in the UTAUT theoretical framework to better explain users' post-adoption usage of smartphone payment services.

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## Appendix A

### *Measurement scales and items*

| <i>Constructs</i>       | <i>Measured items</i>                                                                                                                                                                                                                                                                                                                                             | <i>Sources</i>                                    |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Continuance intention   | CI1: I intend to continue using the smartphone banking service<br>CI2: My intention is to continue to use smartphone banking service rather than any other means of banking in the future.<br>CI3: I intend to continue using the smartphone banking service                                                                                                      | Bhattacharjee (2001) and Baabdullah et al. (2019) |
| Trust                   | TR1: I believe that smartphone banking providers keep customers' interests in mind.<br>TR2: The information provided by the smartphone banking service is reliable.<br>TR3: The other parties involved in smartphone banking service are completely honest in their dealings with one another.<br>TR4: Overall, I believe that smartphone banking is trustworthy. | Gefen et al. (2003), Gao et al. (2015)            |
| Effort expectancy       | EE1: It would be easy for me to become skilful at using smartphone banking service<br>EE2 I would find smartphone banking service is easy to use in shopping<br>EE3: Learning to use smartphone banking service would be easy for me<br>EE4: Overall, I understand how much effort I would have to expend using smartphone banking service                        | Venkatesh et al. (2003)                           |
| Performance expectancy  | PE1: Using smartphone banking service increases my productivity.<br>PE2: Using smartphone banking service helps me accomplish tasks more quickly.<br>PE3: Using smartphone banking service increases my chances complete tasks that are important to me.<br>PE4: I find that smartphone banking service is useful in my daily life.                               | Venkatesh et al. (2003)                           |
| Personal innovativeness | PI1: If I heard about new information technology, I would look for ways to experiment with it<br>PI2: Among my peers, I am usually the first to try out new services offered by smartphone banking providers<br>PI3: I like to explore new online service<br>PI4: In general, I am eager to try out new smartphone banking service                                | Mohammadi (2015), Chiu et al. (2019)              |

*Measurement scales and items (continued)*

| <i>Constructs</i> | <i>Measured items</i>                                                                     | <i>Sources</i>          |
|-------------------|-------------------------------------------------------------------------------------------|-------------------------|
| Social influence  | SI1: People who are important to me think that I should use smartphone banking service    | Venkatesh et al. (2003) |
|                   | SI2: People who influence my behaviour think that I should use smartphone banking service |                         |
|                   | SI3: My partners think that I should use smartphone banking service                       |                         |
|                   | SI4: My banks have supported my the use of smartphone banking service.                    |                         |