

Promoting fintech: driving developing country consumers' mobile wallet use through gamification and trust

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Abstract

Purpose – M-wallets have emerged as one of the most important financial innovations of the 21st century, enabling users to carry digital cash by securely storing payment methods on their mobile devices. However, the continued use of m-wallets varies among people for several reasons. This study used the technology continuation theory (TCT), gamification and trust factors to examine the variables affecting consumers' intentions to continue using mobile wallets.

Design/methodology/approach – The SmartPLS partial least squares software was used to analyze data from 431 m-wallet users in Vietnam using the structural equation modeling technique.

Findings – The data revealed that the research model can predict users' intentions to continue using mobile wallets. TCT constructs demonstrated strong exploratory power in explaining consumer satisfaction and attitudes towards m-wallets. Furthermore, the study confirmed the direct effect of the perceived effectiveness of gamification on perceived ease of use and attitude, as well as its indirect effect on consumers' continued use intentions of mobile wallets via attitude. In addition, the trust negatively influenced consumers' intentions to continue using m-wallets.

Practical implications – The findings of this study can help researchers, practitioners and policymakers improve m-wallet design, development and adoption, as well as advance financial technology and define the future of digital payments in terms of consumer attraction, engagement and financial inclusion.

Originality/value – Based on TCT theory, this study enriches m-wallet research by examining two important factors, gamification and trust, and thus provides insights into how to improve consumers' intentions to continue using m-wallets in developing countries. This study offers timely insights into theory and practice regarding these factors. It therefore paves the way for researchers and practitioners to learn how easy, enjoyable and secure the end-user experience should be to keep users engaged with m-wallets.

Keywords M-wallets, Gamification, Trust, Consumers, Continued use, Fintech

Paper type Research paper



1. Introduction

The rapid development of mobile technology in recent years has significantly transformed consumer behavior and business practices (Lew *et al.*, 2020). One notable outcome of this evolution is the emergence of mobile wallets, which have converted traditional physical wallets into mobile wallets through the convergence of mobile technologies and payment methods (Leong *et al.*, 2020). Mobile wallets, or m-wallets, provide users with the convenience of conducting financial transactions using their smart devices, both online and offline, providing advantages beyond physical wallets (Mu and Lee, 2022; Chatterjee and Bolar, 2018). These benefits include cashless transactions, faster payments, reduced fraud, and time and effort savings (Chawla and Joshi, 2020; Shaw and Kesharwani, 2019).

M-wallets help not just consumers, but businesses have also realized the potential of m-wallets in increasing sales, attracting new customers, and retaining existing ones (Chatterjee and Bolar, 2018). The demand for m-wallets has risen dramatically, notably during the COVID-19 outbreak (Goel *et al.*, 2022; Forbes, 2022). Furthermore, middle-class consumers in developing countries such as China, India, Mexico, and Vietnam are abandoning cards in favor of m-wallets to avoid the poor financial infrastructure and the numerous benefits that m-wallets provide (Kumar *et al.*, 2020; Cao *et al.*, 2018; Nguyen, 2021). Recent reports show that Global m-wallet expenditures are projected to reach \$10tn in 2025, highlighting this technology's significant growth and importance (Remitly, 2023; Lim *et al.*, 2022). Prominent examples of m-wallets include Google Pay, MoMo, Apple Pay, Samsung Pay, Ali Pay, EasyPaiza, Gcash, and WeChat (Remitly, 2023).

Despite their widespread use and benefits, previous research indicates that many factors influencing consumers' adoption and continued use of m-wallets remain unexplored (Leong *et al.*, 2020; Abbasi *et al.*, 2022). Furthermore, the research identifies several barriers that prevent consumers from using m-wallets, including jarring user experiences, trust, security, and privacy concerns (Financemagnates, 2023). Previous studies examining consumers' use of m-wallets identified several research gaps. First, the majority of research has focused on initial user adoption using models such as the technology acceptance model (TAM), the expectations confirmation model (ECM), the diffusion of innovation theory (DOI), and the unified theory of acceptance and usage of technology (UTAUT/UTAUT2), but these models lack explanatory power when it comes to an understanding the m-wallet post-adoption stage (Liao *et al.*, 2009; Rahi and Ghani, 2019). Recent research suggests that the use of robust models such as technology continuation theory (TCT) can aid in the prediction and understanding of post-adoption and continued use of m-wallets (Liao *et al.*, 2009; Foroughi *et al.*, 2019; Talwar *et al.*, 2020). Second, the incorporation of gamification elements, which apply game design principles and strategies to non-gaming contexts, has improved user interaction with information systems (Bitrián *et al.*, 2021; Foroughi *et al.*, 2023; Nasirzadeh and Fathian, 2020). Due to the recent development in customer experience and to enhance it, gamification is a new concept introduced lately (Chauhan *et al.*, 2022). While gamification has been applied to consumer finance apps such as Acorn, Digits, and Stash, existing research primarily focuses on utilitarian aspects and falls short in exploring the potential benefits of gamification elements in increasing m-wallet usage (Purohit *et al.*, 2022; Chauhan *et al.*, 2022; Dikcius *et al.*, 2021; Yang *et al.*, 2023). Third, research shows that, due to the lack of personal interactions during transactions and growing consumer concerns about data security, understanding the role of consumer trust when using m-wallets can help explain why people should continue to use m-wallets (Shaikh *et al.*, 2022; Abdul-Halim *et al.*, 2022). Based on the existing gaps in research on the continued use of m-wallets, this study, therefore, seeks answers to the following questions,

RQ1. Can the TCT theory, compared to existing theories, more accurately predict consumers' continued use of mobile wallets?

RQ2. How does gamification as an independent variable impact the constructs of the TCT theory to enhance the continued use intentions of m-wallet users? And,

RQ3. How significant is trust in the context of mobile wallet continuation use for consumers in addressing their privacy and security concerns?

Although there are an ample number of studies that have examined various factors influencing consumers' m-wallet use, our review of the literature shows that the constructs of TCT theory, together with gamification and trust as triggering factors, can help better understand consumers' m-wallet continuous use. Accordingly, this study contributes to both theory and practice in several ways. From a theoretical standpoint, this study attempts to address the calls of existing studies suggesting how to improve the effectiveness of mobile payments using different levels of grand and mid-range theories, as well as focusing on examining consumers' trust concerns in mobile payments in a developing country context (Ooi and Tan, 2022). Accordingly, this study (1) employs a robust model to understand consumers' continued use of m-wallets (Abdul-Halim *et al.*, 2022; Kaur *et al.*, 2020); and (2) unlike previous research that looked at the indirect effect of trust (Talwar *et al.*, 2020), we believe that understanding the direct effect of trust on continued use intentions is critical to understanding how to alleviate consumers' security and privacy concerns about m-wallets (Foroughi *et al.*, 2019; Cheng *et al.*, 2019; Abbasi *et al.*, 2022). Furthermore, in response to the m-wallet research calls, this study examines how the potential of gamification elements can improve m-wallet continued usage (Bitrián *et al.*, 2021; Nasirzadeh and Fathian, 2020; Noorbehbahani *et al.*, 2019; Chauhan *et al.*, 2022). While most of the literature on consumer m-wallet usage focuses on utilitarian aspects, our study adds to that body of knowledge and aims to show how gamification elements may have a positive impact on m-wallet usage (Purohit *et al.*, 2022). From a managerial standpoint, this study provides valuable strategic insights to m-wallet service providers, particularly in developing countries (e.g. Vietnam), for increasing consumer engagement, addressing security and privacy concerns to retain users, and incorporating gamified elements to increase customer value (Shaikh *et al.*, 2022; McKinsey and Company, 2022a, b; Sankaran and Chakraborty, 2023). Thus, the results of this study would aid bank marketing managers in developing and implementing efficient advertising and marketing strategies. The study's findings would also give the government more information about how to connect with financially vulnerable consumers or unbanked consumer segments to not only promote a cashless society but also increase transparency and financial inclusion (Shaikh *et al.*, 2022; Ooi and Tan, 2022).

The remainder of this paper is structured as follows: The section provides a literature review and the study's theoretical framework. The methodology is covered in the third section, followed by data analysis and study results in the fourth section. The fifth section contains the discussion and conclusion. Finally, the implications for academics and practitioners are discussed, along with research limitations and future research recommendations.

2. Literature review

Since their introduction, m-wallets have experienced exponential expansion worldwide (Chatterjee and Bolar, 2018), supporting a wide range of monetary transactions such as consumer-to-business, consumer-to-consumer, consumer-to-machine, and consumer-to-online (Leong *et al.*, 2020). It has been anticipated that m-wallets will significantly drive new consumer habits away from cash and toward electronic transactions (Lew *et al.*, 2020). Accordingly, previous research has examined the role of various factors through the lens of different theoretical frameworks available in the existing literature and come to insightful conclusions to accelerate the use of m-wallets (Liao *et al.*, 2009; Mu and Lee, 2022; Foroughi

et al., 2019). (See Table 1). According to our review of preliminary research on the topic, gamification, and trust, together with TCT constructs, can help increase consumer engagement with mobile wallets. Huotari and Hamari (2017) define gamification as the process of improving service by providing opportunities for game-like experiences. In the context of m-wallets, Bayuk and Altobello (2019) conclude that gamified features increase consumers' engagement with financial smartphone apps and could improve their financial well-being. Similarly, Purohit *et al.* (2022) argue that gamification improves banking and fintech offerings as well as customers' experiences. Research further concludes that the effective implementation of gamification may result in a more positive evaluation of the technology and a more positive attitude and intention toward m-wallet services (Yang *et al.*, 2023). Gamification features like rewards for conducting transactions using online portals and apps are powerful tools to enhance financial literacy (Chauhan *et al.*, 2022). According to Nasirzadeh and Fathian (2020), one of the most important factors in consumers' adoption of electronic banking is gamifying the banking system. Rahi and Ghani (2019) concluded in their study that the effect of gamification on the user's intention to adopt and the user's intention to recommend Internet banking is stronger when the gamification effect is greater. Similarly, Chauhan *et al.* (2022) claim in their study that gamifying customer-related factors can help the bank's customers engage with its digital channels. In their study, Jesslyn *et al.* (2023) discovered that gamification positively influences attitudes and increases behavioral control among digital wallet consumers. Likewise, Dang *et al.* (2023) came to the same conclusion in their study, which found that adding gamification components to mobile wallets can help the providers give users a better experience and make them perceive the value of their services as being higher.

Similarly, previous research shows that understanding consumers' privacy and security concerns when using mobile payments is important. According to Khayer and Bao (2019), trust is one of the effective factors that may explain why consumers continue to use m-wallets. Similarly, trust is regarded as the most important factor in establishing online transactions and promoting the adoption of mobile financial transaction technologies (Thusi and Maduku, 2020). In their study examining consumers' continued e-wallet use intentions, Daragmeh *et al.* (2021) found trust to be a critical parameter that influences consumers' intentions toward e-wallet continuous adoption. Because mobile wallet transactions are risky, a legitimate justification, such as trust in this payment method, is required to persuade consumers to use mobile payments (Abdul-Halim *et al.*, 2022). According to Chawla and Joshi (2020), despite customers' evaluations of m-wallets as easy to use, beneficial, and safe, their attitudes and intentions will be low unless they trust this service. In the recent literature review study of mobile financial services conducted by Shaikh *et al.* (2022), they show trust as one of the most important factors consumers consider because of the nature of online and mobile payments. Because previous research has shown that investigating gamification and trust as drivers of m-wallet continuance intention is important not only for consumers but also for businesses in terms of engagement and retention, this study theorizes the research framework based on TCT theory constructs with the addition of these two variables.

2.1 Theoretical framework and hypotheses development

2.1.1 Technology continuance theory (TCT).

Researchers have primarily used various theories in m-wallet adoption and use research, including the technology acceptance model (TAM) (Davis, 1989), diffusion of innovation (DOI) (Rogers, 2003), expectation confirmation model (ECM) (Bhattacharjee, 2001), and cognitive model (COG) (Oliver, 1980). The unified theory of acceptance and use of technology (UTAUT/UTAUT2) has also been used to predict technological acceptance and use (Venkatesh *et al.*, 2003; Venkatesh *et al.*, 2012). All these theories have different assumptions regarding information system continuance use and,

Reference	Aim/objective	Theories used	Methodology used	Findings
Walden and Foreman (2021)	How gamification can help you meet your financial goals	Conceptual	N/A	Adding a fun twist to traditional spending or saving may be worth exploring
Khayer and Bao (2019)	To examine the continuance intention of mobile payment	Technology continuation model (TCT)	Quantitative/ cross-sectional	The positive influence of confirmation and perceived usefulness on continuance intention through satisfaction. Also, perceived usefulness, satisfaction, context and ubiquity directly impact the continuance intention through attitude
Shaw and Kesharwani (2019)	To identify the catalytic role of smartphone addiction in driving mobile wallet payment adoption	Technology acceptance model (TAM)	Quantitative/ cross-sectional	Except for perceived ease of use and financial cost, the effect of perceived usefulness, perceived credibility and subjective norms influencing behavioral intention to use m-wallets were positive. When tested on multigroup, only the perceived cost negatively influenced behavioral intention to use m-wallets
Daragmeh <i>et al.</i> (2021)	To investigate the potential for consumers' continued usage of e-wallets	Health belief model (HBM) and Technology continuation model (TCT)	Quantitative/ cross-sectional	Except for perceived ease of use, all other factors positively influence consumers' continued usage of e-wallets
Garrouch (2021)	To verify whether continuance intention is indirectly influenced by reputation, the technology acceptance including, perceived value, trust and security	Technology acceptance model (TAM)	Quantitative/ cross-sectional	Except for ease of use the remaining variables positively influence consumers' continued use of m-wallets
Wong <i>et al.</i> (2022)	Investigate the use of gamification in promoting consumers' adoption of mobile payment	Technology acceptance model (TAM)	Quantitative/ cross-sectional	The perceived enjoyment of the game determines perceived gamification's effectiveness and contributes to users' attitude development, both directly and indirectly through perceived usefulness. Risk perception was identified as a barrier to converting a positive attitude into an adoption intention

(continued)

Table 1.
Overview of some previous studies on m-wallet use

Table 1.

Reference	Aim/objective	Theories used	Methodology used	Findings
Malik and Singh (2022)	To determine the significant factors influencing the usage and continuance usage of M-payment apps and particularly how gamified features enhance the usage of M-payments apps	The unified theory of acceptance and use of technology (UTAUT2) and information system success (ISS) theory	Quantitative/ cross-sectional	Gamified features significantly mediate behavioral intention to adopt and usage of mobile payments, however, gamified features partially mediate continued usage of M-payments. Trust is essential for M-payments users to continue using them
Abdul-Halim et al. (2022)	To investigate the determinants of e-wallet continuance usage intention	Technology continuance theory (TCT)	Quantitative/ cross-sectional	Perceived usefulness (PU) and trust do not affect consumers' continued use of e-wallets. However, there is a significant influence associated with perceived ease of use (PEU), PU and satisfaction toward the user's attitude that, in turn, substantially impacts the intention of consumers to continue using e-wallets
Ly et al. (2022)	To study the determinants of m-wallet continuance usage	The unified theory of acceptance and use of technology (UTAUT2)	Quantitative/ cross-sectional	Aside from effort expectancy, performance expectancy and facilitating conditions, hedonic motivation, trust, price savings, habit and social influence all have a positive influence on consumers' intentions to use m-wallets. Furthermore, consumers' intent to use m-wallets influences their continued use
Nasirzadeh and Fathian (2020)	To find out about the preferences of individuals for personalized gamified systems in the banking domain	Big five personality traits	Quantitative/ cross-sectional	A set of guidelines has been provided for designers to enable them to design gamified systems in a way that recognizes different individuals based on their unique characteristics and using the provided guidance, they can treat users in a personalized manner

(continued)

Reference	Aim/objective	Theories used	Methodology used	Findings
Kaur <i>et al.</i> (2020)	To understand the behavior of consumers regarding one mobile payment system, m-wallets	Diffusion of innovation (DOI)	Quantitative/cross-sectional	Intentions toward m-wallets were significantly influenced by relative advantage, compatibility, complexity and observability. However, there was no relationship between trialability and participants' intentions to use and recommend m-wallets to others Except for an insignificant direct effect of perceived ease on satisfaction and an insignificant indirect effect of perceived ease of use on continued use intentions of mobile shopping via satisfaction, the effect of mobile service quality dimensions and TCT constructs on continued use intentions of mobile shopping was positive Gamification positively influences consumers' attitudes, perceived behavioral control and subjective norms and except attitude, the effect of perceived behavioral control and subjective norms positively influences continuance intention to use digital payments The authors identified three major categories or domains that encompass the entire spectrum of digital financial services within the context of mobile financial services. The authors developed and presented a comprehensive framework of MFS domains, as well as 14 distinct research themes for future MFS research
Jain <i>et al.</i> (2022)	Examines the pre-purchase and post – purchase dimensions of mobile shopping	Technology continuance theory (TCT) and Technology acceptance model (TAM)	Quantitative/cross-sectional	
Jesslyn <i>et al.</i> (2023)	To examine the impact of the gamification on the continued use intentions of the digital payment services	Technology acceptance model (TAM)	Quantitative/cross-sectional	
Shaikh <i>et al.</i> (2022)	Literature review on advances in mobile financial services	Theory, construct, method, moderator (TCMM)	Systematic literature review	

(continued)

Table 1.

Table 1.

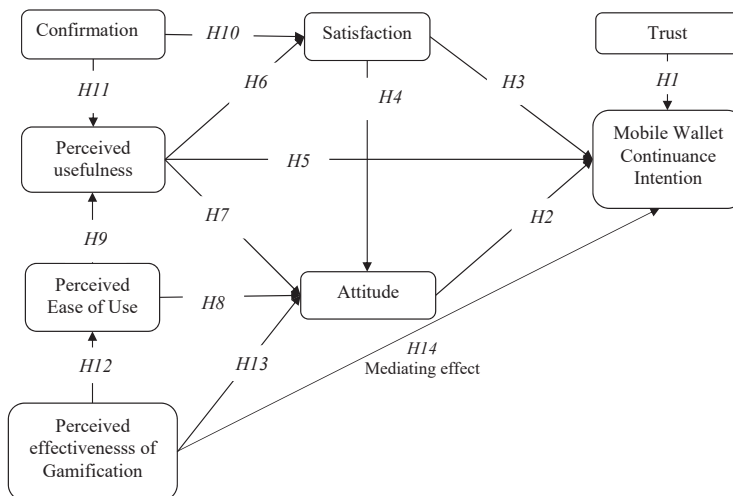
Reference	Aim/objective	Theories used	Methodology used	Findings
Talwar <i>et al.</i> (2020)	Examines pre and post-adoption factors of m-wallets	Information systems success (ISS) model, transaction cost economics (TCE) and expectation confirmation theory (ECT)	Quantitative/ cross-sectional	Information and service quality positively influence initial trust, which in turn has a positive relationship with confirmation and perceived usefulness. The results also show a positive relationship between perceived usefulness and intention to continue
Chauhan <i>et al.</i> (2021)	To explore and extend the existing literature on the use of gamification in banking	Theory, construct, method and moderator (TCMM)	Systematic literature review	To understand the personality traits and customer behavior resulting from the use of gamification in the banking context, more literature evidence and empirically tested and validated research methods are required
Source(s): Authors' own creation				

therefore, have distinct explanatory powers (Liao *et al.*, 2009; Kaur *et al.*, 2020). In addition, while applying these theories, m-wallet research reveals an insignificant effect of different factors, particularly usability and security factors, on the continued use of m-wallets (Shaw and Kesharwani, 2019; Abdul-Halim *et al.*, 2022; Ly *et al.*, 2022).

In this case, technology continuance theory (TCT) seems to be an appropriate theory for understanding the continued use of m-wallets. According to the TCT model, five key constructs such as confirmation, perceived usefulness, perceived ease of use, satisfaction, and attitude have an impact on users' intentions to continue using an information system (Liao *et al.*, 2009). Furthermore, the TCT demonstrates remarkable explanatory capabilities when evaluating consumers' continued engagement with information systems by integrating satisfaction and attitude (Cheng *et al.*, 2019). Numerous studies have demonstrated the applicability and effectiveness of the TCT model in elucidating consumers' continued use of different information systems. For instance, the TCT has been successfully employed to explain the continuous intentions of students to learn online (Alraimi *et al.*, 2015), the continuous use of ride-hailing services by consumers (Nguyen-Phuoc *et al.*, 2020), the continued intentions to use retail brands' mobile augmented reality applications (Nikhashemi *et al.*, 2021), and the continued adoption of m-wallets (Talwar *et al.*, 2020; Abul-Halim *et al.*, 2022). Accordingly, considering the complexities surrounding the continued use of m-wallets and previous research suggesting the need for robust models (Kaur *et al.*, 2020; Rahi and Ghani, 2019), this study uses the TCT theory. Since TCT's strong explanatory power makes it an ideal choice for predicting consumers' intentions to continuously use m-wallets, this research seeks to shed light on the underlying drivers that influence consumers' sustained m-wallet usage intentions. (See Figure 1).

2.2 Hypothesis development

2.2.1 Trust and consumers' continued use intentions of mobile wallets. Research shows that trust reduces consumers' fears and concerns about the privacy of their personal information and the safety of mobile banking transactions (Hassan and Wood, 2020). It is also possible that due to the security and privacy risks involved and depending on the associated



Source(s): Authors' own creation

Figure 1.
Conceptual framework

objectives, consumers may avoid using mobile payments (Shao *et al.*, 2019); therefore, trust can negatively influence consumers' continued use of m-wallets (Abul-Halim *et al.*, 2022). Baptista and Oliveira (2016) believe trust positively influences consumers' intentions to use mobile banking services. Similarly, in their study, Kumar *et al.* (2020) found that consumers' trust in fintech services' privacy and security features increases the adoption of information systems. Singh and Sinha (2020) found that trust positively influences consumers' intentions to use or continue using mobile payments. Therefore, we hypothesize that,

H1. Consumers' trust in m-wallets positively influences their continued use of mobile wallets.

2.2.2 Attitude and consumers' continued use intentions of mobile wallets. Attitude refers to the extent to which an individual has positive or negative feelings about performing the target behavior (Liao *et al.*, 2009). When people have a favorable attitude toward a novel system or technology, they are more enthusiastic about taking advantage of it (Weng *et al.*, 2017). Consumers with favorable attitudes toward a product or service are described as eager to accept and continue using it (Cheng *et al.*, 2019). Similarly, researchers have empirically found that attitudes positively influence consumers' intentions to continue using financial systems. In their study, Rahi *et al.* (2021) found that attitude positively influences consumers' internet banking use. Similarly, Foroughi *et al.* (2019) found in their study that consumers' attitudes positively influence their continued use of electronic banking. Likewise, in the context of mobile wallets, Khayer and Bao (2019) found that consumers' attitudes positively influence the continued use of mobile wallets. In addition, in their study, Daragmeh *et al.* (2021) found that consumers' attitudes positively influence the continued use of electronic wallets. Realizing the importance of attitude in the m-wallets' continued use, the following hypothesis is posited:

H2. Consumers' attitude toward mobile wallets positively influences their continued use of mobile wallets.

2.2.3 Satisfaction and consumers' continued use intentions of mobile wallets. In the context of information systems, user satisfaction tends to strengthen their intention toward continued use (Bhattacharjee, 2001). Satisfaction is a crucial indicator of information systems' continued use and success (Geebren *et al.*, 2021). The positive influence of satisfaction on consumers' continued use intentions of information systems, particularly electronic banking, and m-wallets, has been proven in many studies. For instance, Ofori *et al.* (2017) found that there is a direct influence of the user's satisfaction on the intention to continue using Internet banking. Gilani *et al.* (2017) also highlight that satisfied consumers are more likely to show the intention to use a particular information system continuously. In their study, Li and Liu (2014) found that satisfaction predicts consumers' continued use of e-wallets. In a similar study to predict the continued use intentions of Internet banking, Rahi *et al.* (2021) found consumers' satisfaction to be an important factor. Similarly, in their study, Cheng *et al.* (2019) found that satisfied consumers use e-wallets continuously. Khayer and Bao (2019) also found that satisfaction positively influences consumers' continued use of mobile payments. It is therefore hypothesized that.

H3. Consumers' satisfaction positively influences their continued use of mobile wallets.

2.2.4 Satisfaction and consumers' attitude toward mobile wallets. According to Gilani *et al.* (2017), attitude and satisfaction are synonymous; while attitude is more stable and transcends prior experiences, satisfaction appears to be viewed as a momentary factor related to experiences. According to Goel *et al.* (2022), satisfaction is an indicator of the customer's experience and an evaluation of the overall performance of the products and services. Prior studies on consumers' intentions to continue using mobile wallets have discovered that

satisfied users have a generally favorable attitude towards doing so. For instance, [Liao et al. \(2009\)](#) found in their study that satisfied consumers have a positive attitude toward mobile payments. [Weng et al. \(2017\)](#) conclude that satisfaction predicts consumers' attitudes and continued behaviors. In the context of mobile payments, [Foroughi et al. \(2019\)](#) and [Khayer and Bao \(2019\)](#) found that satisfaction drives attitudes toward mobile payments. Based on these research findings, it is therefore hypothesized that,

H4. Consumers' satisfaction positively influences their attitude toward using m-wallets.

2.2.5 Perceived usefulness and consumers' continued use intentions of mobile wallets. Previous research shows that consumers' use of any technology increases when they find it useful in fulfilling a desired task. Perceived usefulness refers to how fast, timesaving, cost-reducing, and quick any task can be when using any information system ([Davis, 1989](#)). According to [Venkatesh et al. \(2003\)](#), users' behavior and intention to continue using any information system may depend on their beliefs about its perceived usefulness. For instance, [Zhang et al. \(2018\)](#) found that perceived usefulness is fundamental to the adoption of banking industry technology. Similarly, in their study, [Hanafizadeh et al. \(2014\)](#) found that perceived usefulness positively influences consumers' mobile banking adoption. [Gilani et al. \(2017\)](#) demonstrated that, when users believe that a particular IT device can increase their productivity, they may wish to continue using it. [Daragmeh et al. \(2021\)](#) also found that perceived usefulness is the strongest predictor of continuous intention to use electronic wallets. Based on these research findings, it is therefore hypothesized that,

H5. Perceived usefulness positively influences consumers' continued use intentions of mobile wallets.

2.2.6 Perceived usefulness and consumers' satisfaction with mobile wallet use. Satisfaction with any information system by consumers means that the system fulfilled their task needs ([Kassim et al., 2012](#)). Similarly, the perceived usefulness of any information system drives consumer or end-user satisfaction, implying that consumers are willingly using that system because they believe they will get satisfactory results ([Kalankesh et al., 2020](#)). Previous studies have concluded a positive relationship between perceived usefulness and satisfaction with information system use. Individuals who view a specific type of IT as useful are more likely to be satisfied with it ([Gilani et al., 2017](#)). In their study, [Weng et al. \(2017\)](#) found that those types of information systems that give their users the perception of being more useful are more likely to be utilized. In the context of m-wallet research, many studies reported a positive relationship between perceived usefulness and users' satisfaction. For instance, [Khayer and Bao \(2019\)](#) find a positive relationship between perceived usefulness and consumers' satisfaction. In addition, [Goel et al. \(2022\)](#) find that the perceived usefulness of mobile payments positively influences consumers' satisfaction with using mobile payments. [Al-Sharafi et al. \(2022\)](#) also found that perceived usefulness positively influences consumers' satisfaction with m-wallets. In a similar study by [Rahi et al. \(2021\)](#), they found that the perceived usefulness of mobile payments positively influences consumers' satisfaction. Accordingly, we hypothesized that,

H6. Perceived usefulness positively influences consumers' satisfaction with using m-wallets.

2.2.7 Perceived usefulness and consumers' attitude toward mobile wallets. Previous research finds that perceived usefulness has a significant positive effect on user attitudes toward information systems. In their study, [Gilani et al. \(2017\)](#) found that the perceived usefulness of electronic medical record systems positively influences the attitudes of medical professionals. Perceived usefulness is also demonstrated as a key factor in forming individuals' attitudes and intentions toward using financial services ([Foroughi et al., 2019](#)). When users are aware

that using a wallet app is advantageous and meets their needs, they are more likely to have a positive attitude toward it (Lim *et al.*, 2022). Similarly, Daragmeh *et al.* (2021) found in their study that perceived usefulness positively influences consumers' attitudes toward mobile wallets. Weng *et al.* (2017) also found that perceived usefulness positively predicts consumers' attitudes toward m-wallets. In the context of mobile wallets, Rahi *et al.* (2021) conclude that perceived usefulness positively influences consumers' attitudes. Based on these research findings, it is hypothesized that,

H7. Perceived usefulness positively influences consumers' attitudes toward m-wallets.

2.2.8 Perceived ease of use and consumers' attitude toward mobile wallets. Perceived ease of use is an individual's assessment of the effort needed to perform a task using new technology (Davis, 1989). In their study, Rahman *et al.* (2013) found that perceived ease of use positively influences consumers' attitudes toward e-commerce websites. Kourouthanassis *et al.* (2010) argue that the design as well as the interaction process of any information system should be fully adaptable to the capabilities and skills of the expected consumers who are not familiar with technology. Given the ease of use of mobile wallets, Lim *et al.* (2022) argue that mobile wallets must be designed with simple functions to stimulate users' interest in adopting them for daily transactions to replace a physical wallet. According to Zhang *et al.* (2018), financial technology systems such as mobile banking employ a highly complex system for conducting financial transactions, and consumers' attitudes are influenced by their perceived ease of use. Wong *et al.* (2022), in their study examining Chinese consumers' adoption of mobile payments, found that ease of use of mobile payments positively influences their attitude toward mobile wallets. Based on the findings of previous research, it is therefore hypothesized that,

H8. Perceived ease of use positively influences consumers' attitudes toward m-wallets.

2.2.9 Perceived ease of use and perceived usefulness of mobile wallets. According to Davis (1989), perceived ease of use is the degree to which a person believes that using a particular system would be free of effort, whereas perceived usefulness helps in enhancing job performance. The easier it is to use IT, the more valuable it will be (Gu *et al.*, 2009). Similarly, Shaw and Kesharwani (2019) state that an information system is found to be more useful when it is easy to use. Previous research concludes that perceived ease of use is a key determinant of perceived usefulness in mobile payment environments. For instance, Foroughi *et al.* (2019) found that perceived ease of use positively influences the perceived usefulness of mobile payments. Similarly, Rahi *et al.* (2021) concluded that the perceived ease of use of mobile wallets positively influences their perceived usefulness. In their study, Wong *et al.* (2022) also found that perceived ease of use positively influences the perceived usefulness of mobile payments. In addition, Daragmeh *et al.* (2021) demonstrated the positive effect of perceived ease of use on the perceived usefulness of electronic wallets. Based on these research findings, we hypothesize that,

H9. Perceived ease of use positively influences the perceived usefulness of mobile wallets.

2.2.10 Confirmation and consumers' satisfaction with mobile wallet use. Confirmation is formed when the performance of a specified technology is greater than or equal to the prior expectation (Liao *et al.*, 2009). Based on the expectancy confirmation model, the confirmation of initial expectations of the information system contributes to the satisfaction of subsequent users (Foroughi *et al.*, 2019). Confirmation deals with the anticipated benefits of using an information system, whereas disconfirmation relates to situations where expectations are unmet (Weng *et al.*, 2017). Previous studies identified that confirmation positively relates to satisfaction with the continued use of digital financial services. Rahi *et al.* (2021) found that

confirmation positively influences consumers' satisfaction with using online banking services. [Abdul-Halim et al. \(2022\)](#) also found that confirmation of expectations of electronic wallets positively influences consumers' satisfaction. In addition, [Khayer and Bao \(2019\)](#) conclude that when electronic wallets meet consumers' expectations, they feel satisfied with using them. Hence, given the importance of the confirmation and satisfaction relationship proven by previous research, it is hypothesized that,

H10. Consumers' confirmation of expectations of using m-wallets positively influences consumers' satisfaction.

2.2.11 Confirmation and perceived usefulness of mobile wallets. If consumers expect a product or service to be useful but then find out it's not during actual use, they might feel confused or conflicted ([Daragmeh et al., 2021](#)). To resolve this conflict, they may adjust how they see the usefulness of the product to match reality. This confirmation process can change how people view electronic wallets, especially when they are not sure what to expect from them ([Hassan and Wood, 2020](#)). Particularly in the research on electronic banking and finance systems, studies confirmed the significant effect of confirmation on perceived usefulness. For instance, [Foroughi et al. \(2019\)](#) conclude that confirmation positively influences the perceived usefulness of Internet banking. [Abdul-Halim et al. \(2022\)](#) found that confirmation of expectations positively influences the perceived usefulness of e-wallets. Similarly, [Khayer and Bao \(2019\)](#) found that confirmation positively influences the perceived usefulness of m-payments. In their study, [Rahi et al. \(2021\)](#) found that confirmation positively influences the perceived usefulness of e-banking. Accordingly, it is hypothesized that,

H11. Consumers' confirmation of their expectations of using m-wallets positively influences the perceived usefulness of m-wallets.

2.2.12 Perceived gamification effectiveness and perceived ease of use of mobile wallets. Gamification integrates game design features, such as reward points, into a system to achieve desired objectives ([Bitrián et al., 2021](#)). [Rodrigues et al. \(2017\)](#) found that users perceive website content, navigation, data, and information more favorably and find it easier to use when interacting with the site using game elements and mechanics. Moreover, the implementation of gamification is supposed to have the ability to enhance user comprehension of mobile payment technology ([Wong et al., 2022](#)); thereby, users perceive the system as simpler to use. Research is limited to examining the influence of gamification on the financial behavior of consumers; however, studies suggest that gamification facilitates online processes and transactions ([Bitrián et al., 2021](#)). [Panyawanich et al. \(2022\)](#) found that applying gamified principles to the design thinking process can effectively increase the motivation and engagement of users with electronic wallets. [Yang et al. \(2023\)](#) also argue that it is expected that the perceived effectiveness of gamification positively influences the perceived ease of use of m-wallet services. Based on the findings and suggestions of previous research on how gamification can help improve the use of mobile payments, we hypothesize that,

H12. The perceived effectiveness of gamification positively influences the perceived ease of use of m-wallets.

2.2.13 Perceived gamification effectiveness and consumers' attitude toward mobile wallets. According to [Leclercq et al. \(2020\)](#) gamification can be understood better how it influences the attitudes of individuals with designed interventions derived from games. Accordingly, most studies examining the role of gamification in banking services have concluded that it significantly boosts customer engagement and improves system performance ([Nasirzadeh and Fathian, 2020](#)). [Rodrigues et al. \(2017\)](#) stated that elements and mechanisms of game design serve as potent instruments for conveying information, altering attitudes, influencing

decisions, and fostering customer loyalty. Attitude represents overall evaluative beliefs and is largely influenced by the behavioral perceptions of individuals (Liao *et al.*, 2009). According to Angelina *et al.* (2019), gamification enhances consumers' acceptance and usage of e-banking services. Similarly, Bayuk and Altobello (2019) find that gamified features increase consumers' engagement with financial smartphone apps and could improve their financial well-being. Research shows that the effective implementation of gamification may result in a more positive evaluation of the technology and a more positive attitude and intention toward m-wallet services (Yang *et al.*, 2023). Accordingly, we hypothesized that,

H13. The perceived effectiveness of gamification positively influences consumers' attitudes toward m-wallets.

2.2.14 The indirect effect of the perceived effectiveness of gamification on consumers' continued use of M-wallets via attitude. When gamification is used effectively in a technological product, users have a more favorable impression of the product (Wong *et al.*, 2022). Research shows that the perceived effectiveness of gamification is a crucial factor in forming consumers' attitudes toward m-wallet services (Yang *et al.*, 2023). Previous research infers that game design can play an instrumental role in conveying information, thus influencing consumers' attitudes and being an important determinant of their continued use of that payment service (Rodrigues *et al.*, 2017). Foroughi *et al.* (2023) discuss that gamification provides an exciting experience that increases consumers' attitudes toward using gamified applications. Appropriately, previous research supports our argument that the continued use intentions of m-wallets can be more effectively understood via the users' attitudes (Baptista and Oliveira, 2016; Noorbehhahani *et al.*, 2019; Bitrián *et al.*, 2021). Accordingly, we argue that as gamification positively influences consumers' attitudes, the perceived effectiveness of gamification is expected to be an important component influencing users' continuation intentions via attitude. Therefore, we hypothesize that,

H14. Consumers' attitudes toward m-wallets play a role as a mediator between the perceived effectiveness of gamification and consumers' intentions to continue using m-wallets.

2.3 Research context

This study aims to investigate the variables that affect a developing country's consumers' m-wallet continued use intentions and has chosen Vietnamese consumers. For instance, m-wallet financial services have globally gained widespread recognition for enhancing banking services' scale, productivity, and quality (Sharma *et al.*, 2018). Particularly in developing countries, the financial industry facilitates consumers, enabling them to conduct touch-free payments (Kapoor *et al.*, 2022). Reports show that m-payments are gaining traction in Asia and Africa at a fast pace. For example, during the COVID-19 pandemic, the use of m-wallets increased by 55% in China, 44% in India, and 20% in Mexico (Remitly, 2023). The benefits of mobile payments have also attracted Vietnamese consumers. The use of m-wallets by Vietnamese consumers is increasing by 35% per year. Among many, the most popular and widely used m-wallets in Vietnam are ZaloPay, which has 100 million users, and MoMo, which has 12 million users (Vietnamnet, 2021). Despite the numerous advantages of m-wallets, there are numerous challenges for both businesses and consumers, which is impeding the successful adoption of m-wallets in Vietnam. Vietnam, formerly one of Southeast Asia's most cash-reliant countries, now has one of the region's highest cashless payment adoption rates in 2020 (Nguyen, 2021). According to research, there is a need for consumer education to increase m-wallet use, as well as government support to help e-wallet providers, banks, and retailers feel like they are all benefiting (Ly *et al.*, 2022). Furthermore,

retailers can promote cashless payment methods if they better understand Vietnamese consumers' trust in m-wallets (Wang *et al.*, 2023).

3. Methodology

3.1 Measures

The proposed hypotheses were tested in this study using a quantitative research design. The variable measures were adapted from previously used and thoroughly tested scales developed to facilitate previous studies on the topic. Confirmation was measured using a 3-item scale; perceived usefulness was measured using a 5-item scale; perceived ease of use was measured using a 5-item scale; satisfaction was measured using a 4-item scale; attitude was measured using a 3-item scale; and continued intention was measured using a 3-item scale. These measures were adopted from the Foroughi *et al.* (2019) study. A 3-item scale of gamification was based on Wong *et al.*'s (2022) study, and the trust variable was measured using a 3-item scale adopted from Sharma and Sharma's (2019) study. We measured all the scale items using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The questionnaire comprises two parts: the first deals with participants' demographic information, and the second contains questions about the variables.

3.2 Sampling and data collection procedure

Respondents were framed using convenience sampling. This sampling method was used for cost-effectiveness and efficiency because the sampling frame was unknown (Oentoro, 2021). The initial survey questionnaire was written in English. As a result, we translated the original questionnaire into Vietnamese before translating it back into English. A back-translation method was used to provide an accurate representation of the questionnaire text in the target language (Tyupa, 2011). The final version of the survey was distributed by a native speaker to reduce response bias and help respondents understand the statements correctly. Respondents were given further details about the data's objectives and confidentiality to prevent non-response bias.

Before the final survey, a preliminary test was conducted with 50 respondents to ensure the structure and validity of the survey instrument. The participants were recruited in Ho Chi Minh City, the largest city in Vietnam. We distributed the survey in two ways: online and offline. First, we showed respondents examples of gamification on m-wallets. Respondents were then asked to answer the question, "Have you ever interacted with gamification on m-wallets?" to confirm they had done so. Respondents who answered yes continued to answer the follow-up questions, while those who answered no were asked to withdraw from the survey. The survey was distributed online as a hyperlink (to a Google form) to the respondents. The number of questionnaires collected from this form accounts for 342 (79.35%). The remaining questionnaires were collected by direct survey by distributing paper questionnaires, which accounted for 89 (20.65%).

3.3 Statistical technique

The data was examined and checked for outliers and missing values to prevent problems with normality. The Statistical Package for Social Scientists (SPSS) statistical software application was used to analyze the respondents' demographic data. Following this, we utilized the statistical application SmartPLS 3.0 and the partial least squares structural equation modeling (PLS-SEM) approach to analyze the data and verify the relationships and model fitness. SEM allows the estimation of the relationships altogether; therefore, it is appropriate in research with multiple constructs represented by several variables. PLS-SEM is used in this study for two reasons: First, PLS-SEM is frequently used when the research

goal is prediction, and the model is complex or exploratory. It is also particularly useful when the sample size is small. Second, when compared to covariance-based structural equation modeling (CB-SEM), PLS-SEM iteratively estimates model parameters and can handle more complex models (Hair *et al.*, 2006; Dash and Paul, 2021). The measurement model was estimated based on the research instrument’s reliability, convergent validity, and discriminant validity. The structural model and hypothesized relationships were then assessed using the bootstrapping results.

4. Results and findings

4.1 Sample characteristics

Out of the 800 distributed questionnaires, respondents submitted 431 (53.9%) completed questionnaires. According to demographic data, there were 59.4% of women and 40.6% of men. The age ranges of 21–30 (40.6%) and 31–40 (38.3%) comprised many of the respondents. In terms of the purpose for which they used an m-wallet, most of them (43.4%) did so to make purchases. In addition, a large percentage of respondents (89.8%) had less than two years of experience using m-banking services (See Table 2).

4.2 Common method bias

As the study method is quantitative, two types of common-method bias assessments were analyzed. First, the results of Harman’s single-factor test revealed that the first factor explained 31.71% of the variance, which falls well below the threshold of 50%, thus indicating that common method bias was not a concern in this study. Second, the collinearity test result revealed that this study’s variance inflation factor (VIF) values ranged between 1.587 and 2.454. The VIF values are below the threshold value of 3.3, indicating that common method bias was not a major issue (Babin *et al.*, 2016).

Variables	Categories	Frequency	%
Gender	Male	175	40.6
	Female	256	59.4
Age (in years)	20 years old and below	28	6.5
	21–30	175	40.6
	31–40	165	38.3
	40 years old and above	63	14.6
Purpose of using m-wallet	To buy products/services	187	43.4
	To pay for bills	105	24.4
	To transfer fund	92	21.3
	Other	47	10.9
Experience of using m-wallet in the past 12 months	1–5 times	149	34.6
	6–10 times	96	22.3
	11–15 times	85	19.6
	16–20 times	73	16.9
	More than 20 times	28	6.5
Experience in using m-wallet	Less than 1 year	219	50.8
	1 but less than 2 years	168	39.0
	2 but less than 3 years	27	6.3
	3 years and above	17	3.9

Table 2. Sample characteristics Source(s): Authors’ own creation

4.3 Assessing the measurement model

The convergent and discriminant validity of the measurement model was assessed using composite reliability (CR) and average variance extracted (AVE) values. The CR values were higher than the commonly used 0.70 thresholds, thus supporting the measures' reliability. As can be seen in Table 3, some AVE values were below 0.50. Previous research suggests that, as the average variance extracted may be a more conservative assessment of the validity of the measurement model based on composite reliability alone, the researcher may infer that the convergent validity of the construct is sufficient (Fornell and Larcker, 1981). We used the Henseler *et al.* (2015) heterotrait-monotrait criterion (HTMT) procedure to test discriminant validity. As a result, the obtained HTMT ratios for the latent variables ranged from 0.112 to 0.798, well below the cut-off value of 0.90. Furthermore, the square roots of all AVE values were higher than the corresponding cross-correlation, and each item loaded most strongly on its corresponding construct. These confirmed the discriminant validity of the constructs (Hair *et al.*, 2017).

4.4 Assessing the structural model and hypotheses results

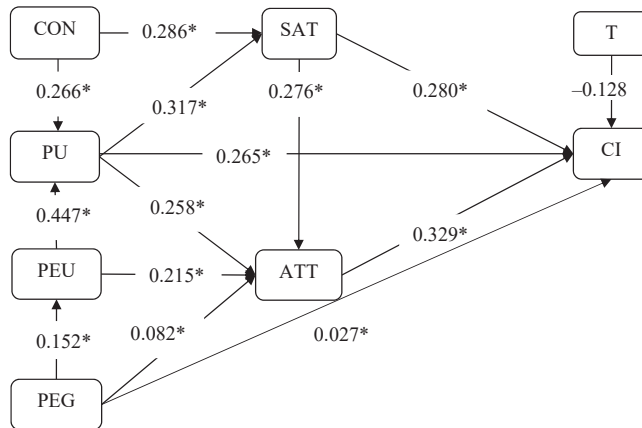
Based on TCT theory, this study established fourteen hypotheses regarding the relationships between the independent variables and the dependent variable. Accordingly, after achieving adequate reliability and validity of the measures, we evaluated the structured model to test the hypotheses (See Figure 2). As the first step in the SEM procedure, the coefficient of determination R^2 was run to check the amount of variance in a dependent variable explained by the independent variables. The results show that independent variables (CON and PU) explained 26% of the variance in the dependent variable SAT. Then, PU, PEU, and PEG explained 39% of the variance in the dependent variable ATT. Furthermore, CON and PEU explained a 36.0% variance in PU, and PEG explained a 2.3% variance in PEU. SAT, ATT, and T explained 56% of the variance in CI. The second step was to compute Q^2 , which is the value of the validated redundancy measures, using the blindfolding command. By demonstrating a value of 0.42 for CI, 0.27 for ATT, 0.01 for PEU, 0.21 for PU, and 0.17 for SAT, Q^2 demonstrated the significant predictability of the model. The model fit was established using the standardized root mean square residual (SRMR), defined as the difference between the observed and model-implied correlation matrices. The SRMR value of the model was 0.04, which was lower than the cutoff value of 0.08, thus demonstrating a good fit (Henseler *et al.*, 2015). The accuracy of the measurement model was evaluated during the subsequent phase. As suggested by Hair *et al.* (2017), using the bootstrapping method of the 5,000 sub-sample sampling tests, we calculated the path coefficients and t -values at a significance level of 0.05. The bootstrapping procedure demonstrates that the path coefficients allow for the strength of the relationship between the model's independent and dependent variables. As a result, the path coefficients (β), t -values, and p -values were used to test the proposed hypotheses of this study. The data supported many of the proposed hypotheses. For instance, trust negatively influences continued intentions to use m-wallets ($\beta = -0.128, p < 0.05$), so the data do not support H1. However, the data supports H2, as attitude toward m-wallets positively influences consumers' continued use intentions of m-wallets ($\beta = 0.329, p < 0.05$). Similarly, satisfaction has a positive influence on consumers' continued use intentions of m-wallets ($\beta = 0.280, p < 0.05$) and their attitude towards m-wallets ($\beta = 0.276, p < 0.05$), so the data support H3 and H4. The results also demonstrate the positive influence of the perceived usefulness of m-wallets on consumers' continued use intentions of m-wallets ($\beta = 0.265, p < 0.05$), satisfaction ($\beta = 0.317, p < 0.05$), and attitude toward m-wallets ($\beta = 0.258, p < 0.05$); hence, the data support H5, H6, and H7. Likewise, perceived ease of use positively influences attitude toward m-wallets and perceived usefulness of m-wallets, so the data supported H8 ($\beta = 0.215, p < 0.05$) and H9 ($\beta = 0.447, p < 0.05$), respectively. The data results further show

Table 3.
Reliability,
discriminant and
convergent validity

Variables	ATT	CI	CON	PEG	PEU	PU	SAT	T	CR ^a	AVE ^b
ATT	(0.747) ^{**}								0.834	0.559
CI	0.635 ^{**}	(0.728)							0.824	0.529
CON	0.478 ^{**}	0.561 ^{**}	(0.723)						0.823	0.523
PEG	0.178 ^{**}	0.229 ^{**}	0.144 ^{**}	(0.691)					0.810	0.477
PEU	0.497 ^{**}	0.623 ^{**}	0.372 ^{**}	0.138 ^{**}	(0.900)				0.813	0.810
PU	0.508 ^{**}	0.580 ^{**}	0.429 ^{**}	0.156 ^{**}	0.548 ^{**}	(0.865)			0.800	0.749
SAT	0.500 ^{**}	0.585 ^{**}	0.423 ^{**}	0.117 [*]	0.470 ^{**}	0.441 ^{**}	(0.765)		0.796	0.585
T	-0.240 ^{**}	-0.312 ^{**}	-0.177 ^{**}	-0.080	-0.223 ^{**}	-0.200 ^{**}	-0.183 ^{**}	(0.650)	0.792	0.423

Note(s): ^{**}Correlation is significant at the 0.01 level (two-tailed), ^{*}Correlation is significant at the 0.05 level (two-tailed), ^aCR = (square of the sum of the factor loadings)/(square of the sum of the factor loadings)² (square of the sum of the error variances), ^bAVE = (sum of squared factor loadings)/(sum of squared factor loadings) (sum of the error variances). The values of the square root of AVEs are shown diagonally in parentheses. Attitude = ATT, confirmation = CON, Mobile wallet continuance intention = CI, perceived ease of use = PEU, perceived usefulness = PU, perceived effectiveness of gamification = PEG, satisfaction = SAT, trust = T

Source(s): Authors' own creation



Note(s): *Significant at 0.05 level

Source(s): Authors' own creation

Figure 2.
Structural model test
results

that confirmation has a positive influence on satisfaction ($\beta = 0.286, p < 0.05$) and perceived usefulness ($\beta = 0.266, p < 0.05$); thus, we accept H10 and H11. Data also supported the perceived effectiveness of gamification's influence on attitude toward m-wallet ($\beta = 0.082, p < 0.05$) and perceived ease of use ($\beta = 0.152, p < 0.05$); therefore, we accept H12 and H13. The data confirmed the mediation of attitude H14, as our findings show that the perceived effectiveness of gamification positively influences consumers' continued use intentions of m-wallets via attitude toward m-wallets ($\beta = 0.027, p < 0.05$) (Table 4).

Hypotheses	Hypothesized path	Path coefficients	<i>t</i> -value	* <i>p</i> -value	Label
<i>Direct effects</i>					
H1	T → CI	−0.128	3.831	0.00	Not supported
H2	ATT → CI	0.329	8.656	0.00	Supported
H3	SAT → CI	0.280	7.304	0.00	Supported
H4	SAT → ATT	0.276	6.116	0.00	Supported
H5	PU → CI	0.265	6.759	0.00	Supported
H6	PU → SAT	0.317	7.287	0.00	Supported
H7	PU → ATT	0.258	5.504	0.00	Supported
H8	PEU → ATT	0.215	4.387	0.00	Supported
H9	PEU → PU	0.447	11.695	0.00	Supported
H10	CON → SAT	0.286	6.836	0.00	Supported
H11	CON → PU	0.266	6.576	0.00	Supported
H12	PEG → PEU	0.152	3.301	0.00	Supported
H13	PEG → ATT	0.082	2.319	0.02	Supported
<i>Indirect effect</i>					
H14	PEG → ATT → CI	0.027	2.162	0.03	Supported

Note(s): * $p < 0.05$ (based on a one-tailed test with 5,000 bootstrapping)

Source(s): Authors' own creation

Table 4.
Hypotheses result

5. Discussion

This study examined consumers' intentions to continue using m-wallets with the help of the TCT. Furthermore, the direct effect of trust on m-wallet usage was investigated. To better understand consumers' continued use of m-wallets, the study also examines the impact of the perceived effectiveness of gamification on perceived ease of use and attitude towards m-wallets, as well as its indirect effect on m-wallet continued use. Data was collected from Vietnamese consumers and tested using the structural equation modeling statistical technique. The results revealed significant support for thirteen out of the fourteen hypotheses proposed in the study, indicating that the research model effectively explains consumers' continued use of m-wallets. The findings underscore the critical influence of factors such as ease of use, perceived usefulness, and confirmation on enhancing consumer satisfaction and fostering positive attitudes towards m-wallets. Furthermore, the study highlights how the effectiveness of gamification can transform a favorable attitude into an intention to continue using m-wallets. The following section discusses the explanations for the findings.

According to the findings of this study, trust has no positive impact on consumers' intentions to continue using m-wallets (H1) (Singh and Sinha, 2020; Abul-Halim *et al.*, 2022). This result demonstrated that consumers have security and safety concerns about m-wallet services; thus, the result contradicts previous studies indicating that consumers will continue to use m-wallet services if they trust the m-wallet provider (Thusi and Maduku, 2020; Kumar *et al.*, 2020). However, consumers' intentions to continue using m-wallets are positively influenced by factors such as attitude (H2), satisfaction (H3), and perceived usefulness (H5). These findings are consistent with previous research that found similar effects (Rahi *et al.*, 2021; Foroughi *et al.*, 2019; Khayer and Bao, 2019; Daragmeh *et al.*, 2021). These results imply that Vietnamese consumers display a positive attitude towards using m-wallet services if they find them useful in terms of fulfilling their payment needs. The results further show that Vietnamese consumers are satisfied with the m-wallet service. In other words, consumers show a positive attitude, are satisfied with using m-wallets, and find m-wallets useful when conducting financial transactions. Similarly, data results show that satisfaction positively influences consumers' attitudes towards m-wallet service (H4), which is consistent with the findings of earlier research and demonstrates that when consumers are satisfied with m-wallet service, they show a positive attitude towards m-wallets (Weng *et al.*, 2017; Khayer and Bao, 2019). Consistent with previous research, the data show that the usefulness of m-wallet services is an important factor for consumers (Daragmeh *et al.*, 2021; Gilani *et al.*, 2017; Cheng *et al.*, 2019), as perceived usefulness positively influences consumers' satisfaction with m-wallets (H6) and their attitude toward m-wallets (H7). Consumers find m-wallets useful in completing tasks, increasing their satisfaction with m-wallets (Davis, 1989). The ease of use of m-wallets is another important factor that the results indicate is important for consumers, as it positively influences the consumers' attitudes toward m-wallets (H8) and the perceived usefulness of m-wallets (H9). This result is consistent with previous research (Rahman *et al.*, 2013; Khayer and Bao, 2019), demonstrating that when information systems do not require extra effort from consumers when used, consumers find them useful, so they show a positive attitude towards using those systems. In the case of this study, for consumers, m-wallets are easy to use, which in turn determines the usefulness of the m-wallet. In addition, when consumers find that the m-wallet is easy to use, it means they find it easy to make transactions, so their experience becomes positive, contributing to the formation of a positive attitude towards the m-wallet. Data results further show that confirmation of expectations with m-wallets positively influences the consumers' satisfaction (H10) and the perceived usefulness (H11) regarding m-wallet services, and the former had a slightly stronger influence than the latter (Rahi *et al.*, 2021; Foroughi *et al.*, 2019; Khayer and Bao, 2019). These findings suggest that an m-wallet system's perceived usefulness and fulfilling pre-experience expectations contribute to greater customer satisfaction (Daragmeh *et al.*, 2021). These findings demonstrate that m-wallets meet the

expectations of Vietnamese consumers; therefore, their satisfaction with m-wallets is positive, and they are also satisfied with m-wallets because they find m-wallets useful for the benefits they achieve from using them. Similarly, the perceived effectiveness of gamification positively influences the perceived ease of use of the m-wallet (H12), indicating that the addition of gamified elements simplifies the m-wallet service for consumers (Wong *et al.*, 2022; Yang *et al.*, 2023; Bayuk and Altobello, 2019). Moreover, the perceived effectiveness of gamification positively influences consumers' attitudes towards m-wallets (H13). This finding is consistent with previous research demonstrating that gamified features in m-wallets generate a positive attitude towards this service among consumers (Bitrián *et al.*, 2021; Nasirzadeh and Fathian, 2020). This finding implies that the inclusion of gamified features in m-wallets would be enjoyable and entertaining for consumers, resulting in the formation of a favorable attitude towards m-wallets. In addition to the factors in the TCT model, the empirical findings validate the indirect effect of the perceived effectiveness of gamification on continuation intentions through attitudes toward m-wallet services (H14). Consistent with previous research, this result concludes that when users believe gamification elements improve the efficiency of using m-wallet services, they are more likely to maintain a positive attitude toward m-wallet services and, as a result, continue to use them (Baptista and Oliveira, 2016; Wong *et al.*, 2022). In other words, gamification elements improve consumers' attitudes and interests, allowing them to continue using m-wallets (Dikcius *et al.*, 2021; Chauhan *et al.*, 2022).

5.1 Theoretical implications

This study significantly contributes to the existing literature by employing the TCT model to examine consumers' continuation usage intentions of m-wallets, thereby shedding new light on this research domain (Abdul-Halim *et al.*, 2022; Liao *et al.*, 2009; Wang *et al.*, 2023). For instance, as the results show that independent variables such as confirmation and perceived usefulness explain 26% of the variance in satisfaction, then perceived usefulness, perceived ease of use, and perceived effectiveness of gamification explained 39% of the variance in attitude, and confirmation and perceived ease of use explained a 36% variance in perceived usefulness. These results indicate that TCT is a powerful tool in explaining not only consumers' attitude and satisfaction but their mobile wallet continuation intentions as well (Foroughi *et al.*, 2019). Furthermore, we incorporated trust and gamification factors into TCT as contextual factors. Previous research has identified trust as the most important factor in establishing online transactions and encouraging the adoption of mobile financial transaction technologies (Shaikh *et al.*, 2022). Furthermore, gamification has emerged as an effective e-marketing strategy for increasing user engagement and enthusiasm (Noorbehhahani *et al.*, 2019). Accordingly, this study not only proved the appropriateness of TCT for assessing the continuance intention use of m-wallets (Khayer and Bao, 2019) but also successfully incorporated trust and gamification factors into the TCT model and concluded insightful results (Yang *et al.*, 2023).

Previous research has identified trust as one of the crucial antecedents influencing consumers' acceptance and subsequent use of financial services, especially when using m-payments. The findings of our study support the concerns of earlier research and thus find that trust negatively influences the continued use intentions of m-wallets (Abdul-Halim *et al.*, 2022). The negative effect of trust on the continued use of m-wallets uncovered in our study contributes to the social exchange theory literature by emphasizing the importance and presence of trustworthiness in the relationship between consumers and m-wallet service providers (Homans, 1958). This important insight not only fills a gap in the m-wallet literature but also highlights the broader implications for understanding the dynamics of trust in technology-mediated service interactions, such as how the presence of trust between the users and providers of m-wallets can help increase adoption and continued use of m-wallets (Kumar *et al.*, 2020; Talwar *et al.*, 2020; Singh and Sinha, 2020). Furthermore, this study concludes how

the effective gamification experience drives consumers' attitudes toward using m-wallets (Yang *et al.*, 2023). The positive influence of perceived gamification effectiveness on perceived ease of use and attitude and its indirect influence on continued use suggest that incorporating gamified features in m-wallet interfaces can evoke hedonistic feelings in consumers, fostering the efficient and continued usage of mobile wallets (Purohit *et al.*, 2022; Yang *et al.*, 2023; Dikcius *et al.*, 2021). This finding is important as it extends gamification research and applications to the financial sector, thus helping researchers understand how this factor improves the ease of use of m-wallets and develops a favorable attitude among consumers when pursuing financial goals (Wong *et al.*, 2022). This finding may connect m-wallet research to the theory of expectancy, which explains that individuals are motivated to perform if they know that their extra performance is rewarded, and to the theory of mood regulation, which explains that individuals aim at maximizing positive emotions and minimizing negative emotions (Mitchell and Albright, 1972; Zillmann, 2000). Furthermore, this finding may contribute to service marketing theory, such as how a gameful experience may improve m-wallet service (Huotari and Hamari, 2017). These findings strengthen the theoretical contributions of our study, such as by aiding existing literature on how a deeper understanding and importance of trust and gamification factors may contribute to the continued use of m-wallets.

5.2 Practical implications

This study additionally offers practical implications for m-wallet service providers, especially in developing countries, seeking to expand their services' adoption and continued usage. First, in the context of Vietnam, to increase users' intention to continue using m-wallets, service providers should focus on enhancing the perceived usefulness, ease of use, and confirmation of their offerings. By offering interactive and user-friendly features as well as streamlining the transaction process, providers can satisfy customers' expectations and encourage frequent m-wallet usage. This approach requires ongoing efforts to meet users' evolving needs and provide seamless experiences that deliver value and convenience. As our research findings show a positive role of gamification in m-wallet use, using game elements in m-wallets can bring tremendous advantages to m-wallet providers; those who fail to adopt may be left behind. Lastly, because the findings of this study show that trust negatively impacts users' continued m-wallet usage, it follows that consumers' decisions to continue using m-wallets in Vietnam are entirely based on trust. In ideal circumstances, a cashless society is safer from theft and robbery; however, when using m-wallets, consumers may have serious concerns about their data and information security. Although it is hard to steal card information and the fraud risks are minimal compared to general card transactions, m-wallet service providers must prioritize the security and privacy of users' personal and financial information and educate consumers on the security measures in place. Furthermore, implementing strong security measures such as advanced encryption protocols, multi-factor authentication, and regular security audits is critical for instilling trust in users so that they continue to use m-wallets. In addition, transparent communication about data protection practices and user rights can foster trust and mitigate consumers' concerns related to privacy and security breaches. The practical implications of this study emphasize the significance of user-centric approaches in the development and delivery of m-wallet services. M-wallet providers ought to be aware of how users' expectations and preferences change over time and constantly innovate and adapt their offerings to meet those needs. The findings of this study may also help regulatory organizations develop strategies and guidelines for mobile wallet providers to expand to more distant areas, which is crucial for reducing economic inequality, particularly in developing nations. Our findings may help m-wallet service providers understand that by improving m-wallet usability, functionality, and security, they will be able to attract an increasing number of unbanked consumers.

5.3 Limitations and recommendations for future research

This study has certain limitations that warrant further examination in future research on the topic. First, due to study limitations, the suggested model was limited to integrating trust and the perceived effectiveness of gamification into the TCT model; thus, we cannot assert that it covers any other factor that may impact consumers' continued intentions toward m-wallet services. Future studies may consider more constructs to build a more comprehensive model. As the study findings indicated a negative influence of trust on the continued use intentions of m-wallets, future research may examine trust as a mediating factor between attitude and continued use intentions. By doing so, combine TCT and stimulus organism and response (SOR) or similar theory to know consumers' pre- and post-m-wallet adoption intentions (Jacoby, 2002). Second, our research lacks the actual usage behavior of m-wallet users. Previous research presumes that the causal relationship between intention and behavior is inconsistent (Rahi and Ghani, 2019). Consequently, adding and measuring actual usage behavior might reveal intriguing findings. Third, the sample was limited to Vietnam, which may have reduced generalizability and thus may not accurately represent m-wallet usage by consumers in other countries. Future research should validate the framework in other countries or consider examining cross-national studies with additional contextual factors to improve the generalizability of their results. Fourth, the study's objective was not to test the effect of the demographic factors; therefore, future research may infer interesting results about consumers' continued usage intentions of m-wallets concerning their demographic characteristics. Future research may examine and compare consumers' continued use intentions of m-wallets concerning their age, gender, education, and occupation, then see the potential differences. For instance, investigating the pre- and post-stages of m-wallet use among various classes of unbanked populations in developing countries may have significant implications for theory and practice development.

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