ISSN 2409-2665
Journal of Logistics, Informatics and Service Science
Vol. 12 (2025) No. 3, pp. 206-226
DOI:10.33168/JLISS.2025.0313

Individual and Platform Factors in Mobile Commerce Adoption: An Integrated SOR-3M Model Analysis in Vietnam

Nam Hoang Trinh and Ha Hong Tran *
HoChiMinh University of Banking, Vietnam
hath@hub.edu.vn (Corresponding author)

Abstract. Mobile commerce (m-commerce) adoption remains inconsistent across different contexts, with limited understanding of how individual consumer characteristics and platform features interact to influence usage intentions. This study develops an integrated framework combining the Stimulus-Organism-Response (SOR) model with the Meta-Theory of Motivation (3M) to examine m-commerce adoption among Vietnamese consumers. Using data from 538 respondents in Ho Chi Minh City and structural equation modeling, we test the relationships between consumer characteristics (knowledge, self-efficacy, trust propensity), platform attributes (security protection, privacy protection), cognitive responses (perceived usefulness, perceived risk), and usage intention. Results show that perceived usefulness (β=0.499, $p<0.001$) and perceived risk (β=-0.353, $p<0.001$) significantly influence m-commerce intention, explaining 43% of variance. Knowledge and self-efficacy significantly affect both cognitive responses, while trust propensity only influences perceived usefulness. Platform security features reduce perceived risk but do not enhance perceived usefulness. These findings suggest that Vietnamese consumers prioritize functional benefits and risk mitigation over security features when evaluating m-commerce platforms. The study contributes to understanding cultural variations in technology adoption and provides guidance for platform designers targeting emerging markets

Keywords: Stimulus organism response, Meta-theory of motivation, Mobile commerce, Intention to use, Consumer behavior

1. Introduction

The widespread adoption of information technology has brought about significant changes across various industries globally, including agriculture, manufacturing, commerce, and services, fundamentally reshaping business practices and boosting labor productivity. Information technology facilitates access to wider markets, enables time-saving online transactions, and expands knowledge through vast information repositories available on global public networks.

The rise of smart mobile devices, with their portability and wireless connectivity, has been instrumental in the development of B2C e-commerce. These web-enabled devices, such as smartphones and tablets, have become indispensable for communication, information access, and entertainment. The increasing use of smart devices has established them as the primary global communication medium. As of October 2024, there are 5.52 billion internet users and 5.75 billion mobile phone users worldwide, with 60% of internet capacity originating from mobile devices. This surge in mobile device usage and mobile application platforms has led to the emergence of m-commerce. In Vietnam, an increasing number of businesses are implementing e-commerce applications to facilitate user shopping activities. Major e-commerce platforms like Shopee, Lazada, and Tiki are investing in mobile applications with user-friendly interfaces and convenient features, allowing users to search for products, compare prices, read reviews, and make transactions. This not only enhances the shopping experience but also fosters the growth of m-commerce. Advances in mobile technology continue to improve the mobile shopping experience, with features such as image-based searches, livestream shopping, and mobile payments providing significant convenience, thereby creating new opportunities for businesses. The growth of m-commerce benefits businesses and contributes to the development of Vietnam's digital economy by creating job opportunities, supporting related industries, and modernizing the economy.

Given the increasing prevalence of m-commerce, many studies have explored factors influencing consumer acceptance and usage of this platform. Research indicates that both technical and convenience factors, as well as consumers' cognitive perceptions of using mobile devices for online shopping, influence consumer adoption of m-commerce. Perceptions of usefulness, ease of use, enjoyment, trust, and perceived risk are crucial in shaping attitudes and intentions toward m-commerce. These cognitive states are influenced by external factors, including user experience, application interface, and social feedback, as well as internal factors like technological knowledge, usage habits, and demographic characteristics.

However, a significant gap in current research is the limited discussion on the role of individual user characteristics and mobile platform features in shaping cognitive perceptions and m-commerce acceptance behavior. Individual user characteristics, such as technology knowledge, self-efficacy, and propensity to trust, are foundational factors that shape consumers' perceptions and emotions. For instance, users with higher technological self-efficacy may be less concerned about security risks, leading to greater trust and comfort in mobile transactions. Similarly, individuals with a strong trust inclination are more willing to accept risks in e-commerce environments, leading to quicker adoption of new services. Neglecting these factors in research models is a major omission, as they are key elements influencing the entire cognitive-emotional-behavioral chain.

Furthermore, mobile platform characteristics, particularly security and privacy protection, are critical in fostering a positive psychological state for m-commerce users. When consumers perceive that m-commerce platforms provide robust personal data protection and transaction security measures, they feel more reassured, enhancing their perceived usefulness and reducing perceived risks. Service providers' commitment to security and data transparency significantly affects m-commerce adoption, especially among first-time users or those with low technological proficiency.

Existing research models such as TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology) are widely used, exhibit significant limitations in fully explaining technology adoption. Both are cognitive-rational frameworks, overemphasizing beliefs like perceived usefulness and ease of use, and underrepresenting critical emotional, affective, and

experiential dimensions. The Stimulus-Organism-Response (SOR) model addresses this by explicitly integrating affective states and internal psychological processes, offering a richer understanding of how stimuli drive behavior. TAM/UTAUT largely treat users as homogeneous, overlooking individual personality traits and stable motivations. In contrast, the 3M model (Mowen, 2000) incorporates a hierarchical trait structure, including elemental traits, to explain stable individual differences in technology-related behavior. Thus, integrating SOR and 3M offers a more flexible and comprehensive framework for modern consumer behavior research.

Therefore, expanding research models to incorporate individual characteristics and mobile technology attributes is imperative, as consumer behavior continues to evolve with the rapid expansion of m-commerce. This approach addresses gaps in existing theoretical frameworks and provides practical insights for businesses to design effective, secure, and user-centric m-commerce applications that cater to the diverse needs of different consumer segments. To achieve this goal, this study proposes an integrated model combining the SOR framework with the 3M model to explain m-commerce adoption intentions. In this proposed model structure, individual characteristics such as technological self-efficacy, technology knowledge, and propensity to trust influence perceptions of usefulness and risk in m-commerce, ultimately shaping consumer purchase intentions. Simultaneously, security and privacy protection (technological attributes) act as environmental stimuli, altering individual cognitive perceptions and thus affecting purchasing behavior via mobile devices.

2. Literature Review

2.1. Mobile Commerce Adoption

M-commerce is establishing itself as the next stage evolve traditional e-commerce. Unlike e-commerce, which takes place on desktop computers or laptops, m-commerce allows consumers to make transactions anytime and anywhere through mobile devices such as smartphones and tablets. This provides exceptional flexibility and convenience for users while also expanding market access opportunities for businesses. That space and time does not limit m-commerce has made it a crucial tool for enhancing customer experiences and optimizing business efficiency in the digital environment.

Mobile shopping has rapidly evolved into a dominant e-commerce trend, fundamentally altering consumer purchasing behaviors. Its widespread adoption is primarily understood through the lens of the Technology Acceptance Model (TAM) and its various extensions. Core to this understanding are the constructs of perceived usefulness and perceived ease of use, which consistently emerge as significant predictors of consumer intention to engage in mobile shopping (Liu & Mensah, 2024; Mollick et al., 2018). Beyond these foundational elements, individual differences, such as personality traits like shopping enjoyment and value consciousness, have been shown to indirectly influence mobile shopping intention by shaping perceptions of usefulness and ease of use (Camoiras-Rodriguez & Varela, 2021). Furthermore, advanced models like UTAUT2 incorporate the concept of perceived value, emphasizing the non-monetary benefits that consumers seek from mobile commerce platforms (Shaw et al., 2019), while consumption value theory identifies epistemic, conditional, emotional, and functional values as crucial drivers of perceived usefulness (Schultz & Kaiser, 2025).

A critical cluster of factors influencing mobile shopping adoption revolves around consumer perceptions of trust, risk, and security. Trust consistently serves as a potent positive driver, significantly impacting both intentions and attitudes towards mobile commerce. Research indicates that the influence of trust can be even more pronounced in mobile contexts compared to other digital interactions, underscoring its paramount importance in fostering consumer confidence (Gavindra et al., 2023; Schultz & Kaiser, 2025). Conversely, perceived risk reliably acts as a deterrent, negatively affecting adoption intentions. This often leads consumers to engage in a "privacy calculus," where they consciously weigh potential privacy concerns and the risks of data misuse against the perceived benefits offered by mobile commerce platforms (Liu & Mensah, 2024; Shaw et al., 2019). The assurance of

robust security measures is therefore vital in mitigating these perceived risks and bolstering trust (Mollick et al., 2018).

Beyond these technological and security perceptions, a range of user-centric psychological factors plays a substantial role in shaping mobile shopping behavior. Perceived enjoyment, for instance, directly contributes to purchase intention and can indirectly influence mobile shopping through its impact on perceived usefulness (Patel et al., 2020; Camoiras-Rodriguez & Varela, 2021). Self-efficacy, defined as a consumer's belief in their ability to successfully use mobile shopping applications, is positively correlated with perceived ease of use and overall adoption intention (Gavindra et al., 2023; Mollick et al., 2018). Additionally, personal innovativeness, reflecting an individual's openness to new technologies, can moderate the relationship between perceived value and mobile commerce adoption, indicating that early adopters may prioritize different benefits (Shaw et al., 2019).

The social environment and the quality of the mobile application itself also significantly impact adoption. Social influence and subjective norms, which reflect the opinions and behaviors of peers and important referents, contribute positively to a consumer's intention to use mobile commerce (Mollick et al., 2018; Trang Tran Pham Huyen, 2024). Furthermore, the intrinsic quality of the mobile application's interface, encompassing aspects like general information quality, product information quality, layout, and visual appeal, is vital for fostering positive user experiences, perceived enjoyment, and trust, ultimately influencing purchase intention (Patel et al., 2020). Similarly, the overall service quality provided through the mobile platform and the presence of facilitating conditions—resources and support that make usage easier—are crucial for driving adoption intentions (Liu & Mensah, 2024; Trang Tran Pham Huyen, 2024).

In conclusion, the adoption of mobile shopping is a multifaceted phenomenon driven by an intricate interplay of technological, psychological, social, and economic factors. While the foundational tenets of perceived usefulness and ease of use remain central, a comprehensive understanding necessitates the integration of critical concepts such as trust, perceived risk, and security, alongside diverse value dimensions. User-centric elements like perceived enjoyment, self-efficacy, and social influence, coupled with the quality of the application's interface and underlying service, are equally crucial for shaping consumer intention. Despite the considerable growth in mobile commerce, continued research is essential to identify and overcome persistent barriers, thereby enabling the development of more effective strategies to enhance mobile shopping engagement across varied consumer segments and contexts (Stefko et al., 2020).

2.2. Conceptual Model

Consumer acceptance or rejection of a specific behavior is not random or impulsive, but the result of a complex interaction between external factors (environmental influences) and internal factors (personal cognition and emotions). This perspective come from the Stimulus-Organism-Response (SOR) Model proposed by Mehrabian and Russell (1974), which originates from the field of environmental psychology. This model suggests that when environmental stimuli (Stimulus - S) expose individuals, they will form internal cognitive states (Organism - O), which then lead to specific behavioral responses (Response - R), such as approach or avoidance behavior. Cognitive states play a crucial intermediary role, determining the individual’s last response to the stimulus.

However, consumer behavior is a very complex phenomenon, influenced by many overlapping factors, and therefore it is difficult to explain by a single theory. Although the SOR model provides a strong theoretical framework for studying behavior, it still has certain limitations. One significant limitation is that the model focuses on external stimuli while neglecting the role of internal characteristics of the individual. This reduces the comprehensiveness of consumer behavior analysis, especially in today’s context, where consumers strongly depend on personal psychology, intrinsic motivation, and transforming socio-technological factors.

Therefore, many recent studies have recommended expanding the SOR model by incorporating internal factors to more fully reflect forming and adjusting consumer behavior. For example, Patel et al.

(2021) suggested that integrating internal motivations into the model is necessary to gain a deeper understanding of consumer shopping behavior, whether in offline, online, or live-streaming environments. Following these approaches, the current study has integrated Meta-theoretic Model of Motivation (3M) (Mowen, 2000) into the SOR model. The 3M model helps explain the role of stable personal characteristics, such as personality traits, background knowledge, confidence levels, and belief tendencies in forming consumer cognitive and behavioral responses. Integrating the 3M model enhances the explanatory power of the overall model, while also clarifying the role of individual factors in the information processing and decision-making process. Specifically, the study inherits and expands the results of previous works, examining consumers from three major aspects: knowledge and understanding (Liu & Mensah, 2024), self-efficacy in choice behavior (Gavindra et al., 2024), and propensity to trust in the digital environment (Kordzadeh & Bozan, 2024). These characteristics are internal stimuli in the overall model, indirectly affecting behavior through the mediation of cognitive responses.

The SOR-3M model offers several advantages over traditional models like TAM and UTAUT when studying technology adoption and digital behaviors. Firstly, SOR-3M provides a more holistic and dynamic perspective. While TAM and UTAUT primarily focus on cognitive beliefs, they underrepresent emotional, motivational, and personality-driven processes. In contrast, SOR accounts for emotional and affective states as mediators between external stimuli and user responses, while 3M introduces deep-seated personality traits and motivational dispositions (e.g., values, needs, competencies) that shape users' responses to technology. This broader scope enables richer explanations of individual differences in technology adoption. Secondly, SOR-3M better captures the interaction between external context and internal psychological processes. TAM and UTAUT largely assume a linear and rational decision-making process, which can be insufficient for emerging technologies characterized by experiential, hedonic, and immersive features. By modeling how stimuli trigger emotions and motivations, SOR-3M can explain non-rational and habitual behaviors often observed in digital environments.

In summary, combining the SOR model with the 3M model provides a more comprehensive theoretical framework that can explain both external and internal factors influencing consumer behavior towards products and services. This integrated approach is not only suitable for the modern technological context but also lays the foundation for future research in consumer behavior, especially in complex digital environments such as e-commerce, social media platforms, and digital ecosystems.

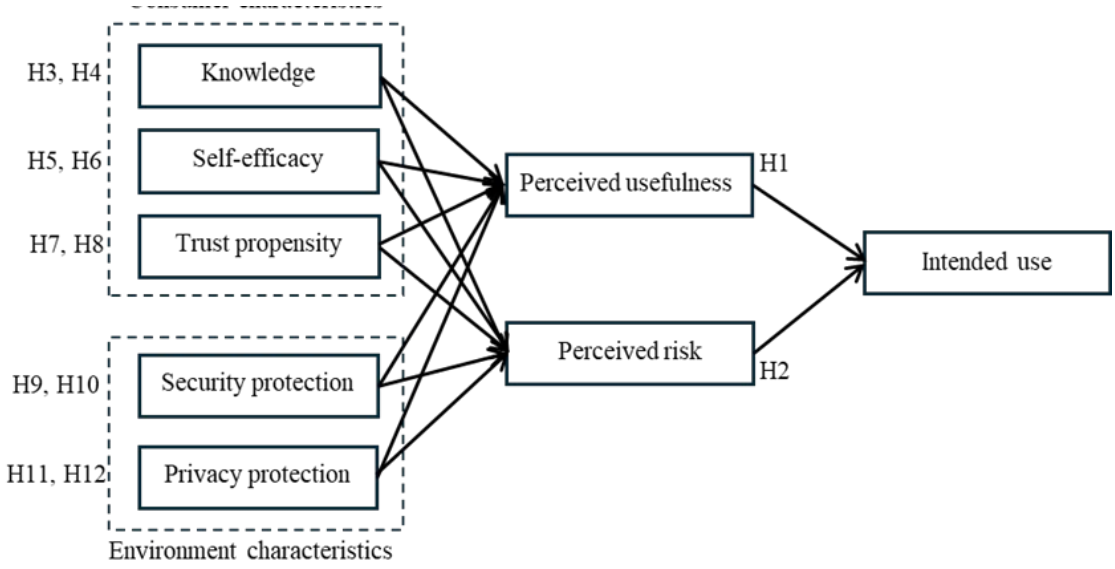

Fig. 1: Theoretical research model

2.3. Hypothesis Development

In the TAM model, Davis et al. (1989) define perceived usefulness as the degree to which an individual believes that using a particular technology will enhance their job performance. In modern commerce, especially in consumer shopping, perceived usefulness is an important factor that reflects the individual's trust that using mobile devices will help improve efficiency and utility in daily transactions. When a technology system provides logical benefits to users, it has the potential to promote their acceptance and use. Huyen (2024) also emphasize that perceived usefulness has a significant impact on consumers' tendency to accept mobile services. Specifically, the study of Liu and Mensah (2024) shows that performance expectancy has a direct and significant impact on the intention to use electronic payment services, reflecting users' belief that technology will bring convenience and efficiency in financial transactions. Mollick et al. (2023) have extended the scope of the survey to the field of Internet and m-commerce, further clarifying the positive correlation between performance expectancy and the tendency to accept technology in daily life. Therefore, this study proposes the following hypothesis:
Hypothesis H1: Perceived usefulness positively impacts the intention to use m-commerce.

Bauer (1960) was the first to propose the theory of perceived risk, defining it as the subjective assessment of consumers about the level of uncertainty and disadvantage compared to their expectations when engaging in a shopping behavior. Following this perspective, In strong technological development, consumers increasingly face extra risks arising from the use of digital services. Featherman and Pavlou (2003) argued that perceived risk is the level of potential loss when using electronic services. Studies have also extended this concept to areas such as mobile payment Camoiras and Varela (2020) and the use of bank cards (Trinh et al., 2020), where users often feel anxious when reality differs from initial expectations. Trinh et al. (2020) showed that perceived risk negatively affects the intention to use electronic payment. The study of Tarhini et al. (2019) also confirmed this result in online shopping. Liu and Mensah (2024) argued that negative expectations created by uncertainty reduce consumers' intention to use travel applications. In the social media environment, Piroth et al. (2020) found that users will reduce their intention to use Instagram if they feel it is time-consuming or ineffective. In the digital banking sector, Shaw and Sergueeva (2019) concluded that customers will refuse to use mobile applications if they do not trust the safety of transactions. Mollick et al. (2023) also argued that perceived risk significantly affects the intention to use chatbots in banking transactions. Based on this, this study proposes the following hypothesis:
Hypothesis H2: Perceived risk negatively impacts the intention to use m-commerce.

In the digital environment, where physical interaction is absent, consumers often face higher levels of perceived risk because of uncertainty, incomplete information, and concerns about the negative consequences of shopping decisions. One of the key factors that helps consumers navigate more effectively in this environment is their level of understanding of products, services, and digital transaction processes. According to the research by Vo and Wu (2022), consumer knowledge acts as a self-defense tool that helps individuals evaluate and filter out misleading or incorrect information, then minimizing anxiety during decision-making. Knowledge also helps individuals better identify credibility signals from providers. Similarly, Vo and Wu (2022) found that consumers do not care about potential damages when using m-commerce applications if they have a full understanding of how to use and shop on mobile. Next, knowledge helps consumers analyze the core value of products, understand how digital services operate, and predict long-term benefits from using products, then increasing perceived usefulness (Yao & Wang, 2024). Zhu and Kubickova (2023) point out that highly knowledgeable individuals often evaluate products and services not only based on immediate benefits but also consider long-term factors such as compatibility, sustainability, or future performance. This builds trust in products/services, then enhancing the intention to use them. Knowledge not only stops at product evaluation but also plays a crucial role in reducing information overload, a common phenomenon in e-commerce when consumers have to process too many choices and information simultaneously (Zhu & Kubickova, 2023). Recent studies on digital consumer behavior also reveal that knowledge plays a mediating role between attitude and behavior, especially in forming perceptions of usefulness and ease of use (Yao & Wang, 2024). Based on this, this study proposes the following hypotheses:

Hypothesis H3: Knowledge positively impacts perceived usefulness.

Hypothesis H4: Knowledge negatively impacts perceived risk.

In the strong digitalization of the global economy, the ability to self-use technology is one of the key psychological factors affecting consumer behavior towards digital platforms and e-commerce services. Self-efficacy, according to Bandura (1999), is the belief in personal competence to perform a specific behavior. However, in the modern context, this concept has been expanded and refined to fit digital behaviors on online platforms. Recent studies also reveal that confidence plays an important role in mitigating the impact of anxiety and risk when interacting with technology. The results from the study by Gavindra et al. (2024) demonstrate that individuals with high confidence levels are better able to control complex technical situations, then reducing dependence on external support and enhancing confidence in online shopping decisions. This aligns with the findings of Liu et al. (2022), that confidence has a reducing effect on perceived risk and enhances trust in e-commerce systems, especially in developing economies. The study by Bartol et al. (2023) shows that confidence plays a role in promoting usage behavior and impresses perceptions of usefulness and ease of use. A study by Capistrano et al. (2024) reveals that users with high self-efficacy levels tend to early adopt automated technologies and easily adapt to new features updated on the platform. Conversely, individuals with low self-efficacy levels often feel overwhelmed and delayed in trying new functions, leading to negative experiences or even refusal to use the service. Based on this, this study proposes the following hypotheses:

Hypothesis H5: Self-efficacy positively impacts perceived usefulness.

Hypothesis H6: Self-efficacy negatively impacts perceived risk.

The concept of trust propensity is as an innate or long-term tendency of an individual to trust others, independent of specific contexts or situations. In the online transaction environment, trust propensity acts as a stable psychological trait, affecting how individuals evaluate and respond to potential risk factors. People with high levels of trust propensity often minimize concerns about risks and easily proceed with transactions based on the positive assumption that the service provider will act reliably and not cause harm (Bouzaabia et al., 2024). They often accept terms of use, privacy policies, and transaction conditions without spending time (Liu & Mensah, 2024). This psychology also helps explain

why some users still feel secure when conducting online financial transactions, even if they do not have deep knowledge of technology or security (Zhao et al., 2024). The relationship between trust and perceived usefulness continues to be reinforced in recent studies. Specifically, the study by Kordzadeh and Bozan (2024) on online services shows that individuals with high trust propensity often evaluate the service as useful from the initial stage, as they place trust in the system and the information provided without immediate verification. Similarly, Zhao et al. (2024) emphasize that users' foundational trust is not merely an independent factor but also acts as a catalyst enhancing the impact of technological characteristics on perceived usefulness. Particularly, in environments characterized by high uncertainty, such as e-commerce or artificial intelligence application systems, trust can determine the initial acceptance and positive evaluation of technology (Revillod, 2025). Therefore, in the current digitalization context, building and maintaining user trust becomes a key strategic factor in promoting the acceptance of new technology. Based on this, this study proposes the following hypotheses:
Hypothesis H7: Trust propensity positively impacts perceived usefulness.
Hypothesis H8: Trust propensity negatively impacts perceived risk.

Consumer perceptions of the level of transaction security provided by sellers reflect their subjective trust in the ability and commitment of online retailers to prevent information security risks. Recent studies show that transparency in privacy policies, the use of security certificates, presence of trust symbols positively impact buyers' perceptions of safety (Canio et al., 2022). Online sellers need to invest in technological measures such as data encryption, two-factor authentication, and real-time transaction monitoring systems to minimize the risk of information leakage (Mollick et al., 2023). Informing consumers about existing security measures and providing safe usage guidelines are crucial factors to strengthen trust and promote purchasing behavior (Koh et al., 2024). Modern studies show that when sellers or e-commerce platforms provide security mechanisms such as data encryption, security certificates, and clear refund policies, it significantly reduces the level of risk perceived by consumers (AlHassan et al., 2025). According to Koh et al. (2024), high levels of security protection from the platform have significantly reduced perceived risk, especially among users who have never shopped online before. Zhang (2024) also shows that the third-party safety certification symbols strengthen trust and significantly reduces perceived risk in the digital environment. Dogra and Adil (2024) study shows that the security factors negatively affect perceived risk while increasing the intention to use e-commerce applications. Not only does security protection impact perceived risk, but it also enhances the usefulness of e-commerce systems. Nguyen et al. (2021) reveal that security protection is one of the most important predictors of perceived usefulness in online banking systems. This is reinforced by the results from AlHassan et al. (2025), where most of surveyed users believe that the safer the technology platform, the more useful and easy-to-use FinTech services are. Otherwise, in mobile payments, where payment behavior occurs quickly and depends on emotions, perceived usefulness is often associated with secure and safe experiences (Nguyen et al., 2021). In study of Zhang (2024), security-related factors such as two-factor authentication and end-to-end encryption, alleviate concerns but also increase the perceived utility of the system, especially among Gen Z consumers who have high expectations for speed and safety. When consumers see a platform with simple rights protection policies and commitments to support in case of incidents, they will evaluate that platform as competent, then increasing perceived usefulness (Handoyo, 2024). Based on this, this study proposes the following hypotheses:
Hypothesis H9: Security protection positively impacts perceived usefulness.
Hypothesis H10: Security protection negatively impacts perceived risk.

In the growing development of e-commerce, personal privacy protection has become a top concern for consumers when engaging in online transactions. Consumers are often hesitant to share personal information if they are not sure that the data will be in safe (Kim et al., 2021). Privacy protection, including clear privacy policies, data access controls, and commitments not to share information with third parties, alleviates consumer concerns and enhances shopping intentions (Zhang, 2024). Recent

studies show that when consumers perceive a high level of control over their personal data, they are more willing to interact and complete transactions (Hengboriboon & Yukongdi, 2024). Clearly disclosing encryption mechanisms, the right to refuse data collection, and transparency in using personal data positively impact trust in e-commerce platforms (Amrollahi et al., 2024). E-commerce platforms with strong privacy policies often have higher customer retention rates. The combination of data security and convenient using experience is becoming a sustainable development trend in modern e-commerce (Mombeuil & Uhde, 2021). According to the study of Song et al. (2024), security mechanisms and transparency in personal data collection affect negatively to the level of perceived risk. According to Kakolu and Faheem (2024), the perception of control over personal information, an aspect of privacy protection, plays a mediating role in reducing perceived risk. Recent evidence shows that privacy protection positively affects perceived usefulness. According to the study by Amrollahi et al. (2024), in the digital environment, when users feel their personal information is safe, they may evaluate the system as more professional, trustworthy, and useful. Perceived usefulness here is not only about technical performance but also includes the psychological comfort of using the service. This is because using experience in the online environment comes from emotions related to trust and peace of mind (Zhang, 2024). Similarly, in the study of online consumer behavior by Zaheer et al. (2024), the authors found that privacy protection contributes to increasing the perceived value of the service, with usefulness being a central factor. Next, according to Li et al. (2023), in the increasing application of artificial intelligence and user behavior analysis, privacy protection is a competitive factor, which enhances perceived value. Modern consumers not only demand convenience but also want the service to respect them. Based on this, this study proposes the following hypotheses:

Hypothesis H11: Privacy protection positively impacts perceived usefulness.

Hypothesis H12: Privacy protection negatively impacts perceived risk.

3. Research Methodology

This study employs a quantitative research approach to test the proposed hypotheses and research model. Given that m-commerce adoption intention is a nascent area of research in Vietnam, the measurement scales for the factors within the model necessitate contextual adaptation. To address this, an expert group discussion technique was utilized to refine and develop the final questionnaire for subsequent quantitative data collection (Gehlbach & Brinkworth, 2011).

The discussion group includes 10 experienced customers, who purchase via mobile device at least once a month, continuously for the past year to clarify the draft scale of factors inherited from previous studies, which are translated by professional interpreter (Ha et al., 2025; Liu & Mensah, 2024; Nguyen et al., 2021; Schultz & Kaiser, 2025; Zaheer et al., 2024). The expert group convened to meticulously evaluate and refine the translated measurement scales for the research model. During the discussion, each item within the scale was rigorously reviewed to ensure clarity, comprehensibility, and ease of response for prospective survey participants. A primary objective was to eliminate ambiguity and optimize the phrasing to facilitate accurate comprehension and response among Vietnamese respondents. The experts also critically assessed the scales' ability to accurately reflect the underlying constructs of the research problem. Leveraging their professional experience, they proposed adjustments to the wording and sentence structure to enhance the reliability and validity of the scales. Furthermore, this focus group discussion process enabled the identification of limitations within the original scales, leading to suggestions for improvement. Upon the conclusion of the session, the finalized measurement instrument was prepared for subsequent research phases.

This study conduct a quantitative research in Ho Chi Minh City, Vietnam, using online interviews with questionnaires designed in an interactive web format using Google Forms. The survey participants are consumers in Ho Chi Minh City and come from the convenience sampling method. The research data includes 538 valid responses used to re-test the measurement model of research concepts, as well as hypotheses about the relationships between concepts. The study choose PLS-SEM over CB-SEM

primarily for its flexibility and predictive power, especially in early-stage theory development or when data conditions are less strict. PLS-SEM is suitable for small sample sizes, non-normal data distributions, and complex models with many latent variables. Its goal is to maximize the explained variance of endogenous constructs, making it ideal for prediction-oriented research. In contrast, CB-SEM focuses on confirming existing theories and requires larger samples and normally distributed data for optimal model fit.

Hair et al. (2022) suggest that the number of observations needed for PLS-SEM must be at least 5 times the number of variables included in the analysis. Thus, with the official scale of 32 observed variables, this study needs at least 240 data to apply analytical tools. Besides, Yamane (1973) proposed the formula for calculating sample size n=N/(1+Ne2), where n is the sample size, N is the total population, and e is the allowable error. According to the report from the General Statistics Office, by the end of 2024, the labor force in Ho Chi Minh City is about 4.9 million people. With an error e=5%, the required sample size is n=400 people. With a data sample of 538 responses, the PLS-SEM analysis technique is suitable for this study.

4. Results

4.1. Measurement Model Validation

The evaluation of the reliability of the scale includes the assessment of the reliability of the observed variables and the reliability of the latent variables. The reliability of the observed variables in the research model is tested using Cronbach's alpha (CA) analysis and composite reliability (CR) analysis. The test results indicate that the variables PR2, PR4, and PU5 have outer loadings less than 0.708; these variables are excluded from the study due to not ensuring internal consistency reliability. The remaining variables all have outer loadings greater than 0.708, and the factors all have CA coefficients greater than 0.794 (Table 2). According to Hair et al. (2022), the above scale is internally consistent and reliable.

Table 1: Measurement Model Test Results

Code	Factor	Minimum outer loadings	CA	CR	AVE	Maximum outer VIF values
KN	Knowledge	0.713	0.869	0.911	0.721	2.835
SE	Self-efficacy	0.809	0.794	0.878	0.705	1.834
PT	Propensity to trust	0.817	0.845	0.906	0.763	2.523
SP	Security protection	0.882	0.915	0.940	0.797	2.903
PP	Privacy protection	0.722	0.811	0.874	0.653	1.929
PR	Perceived risk	0.798	0.812	0.890	0.730	3.000
PU	Perceived usefulness	0.740	0.785	0.858	0.602	1.993
IU	Intention to use	0.869	0.901	0.931	0.770	2.701

Source: Author's synthesis

Convergent validity is the degree to which a measure correlates positively with other measures of the same construct. According to Hair et al. (2022), the convergent validity of the measurement model is assessed through the Average Variance Extracted (AVE) index. The results show that the AVE values of the study are all greater than 0.5, with the lowest being Perceived Usefulness (PU) with AVE = 0.602, and the highest being Security Protection (SP) with AVE = 0.797 (*Table 2*). Thus, the scale achieves convergent validity. Discriminant validity of the scale is the examination of whether a concept is truly different from other research concepts by empirical standards. The results of the discriminant validity assessment show that the Heterotrait-Monotrait correlation index of the factors is all less than 0.85 (*Table 3*). Therefore, the study has a scale that achieves discriminant validity.

Table 2: Discriminant Validity Test Results

	IU	KN	PP	PR	PT	PU	SE	SP
IU								
KN	0.467							
PP	0.571	0.481						
PR	0.511	0.413	0.476					
PT	0.422	0.235	0.248	0.183				
PU	0.653	0.485	0.402	0.207	0.341			
SE	0.427	0.353	0.499	0.405	0.438	0.480		
SP	0.519	0.398	0.632	0.502	0.254	0.331	0.463	

Source: Author's synthesis

4.2. Structural Model Validation

In the structural model, the coefficients for the relationships between concepts are derived from estimating a series of regression equations. Before evaluating the structural relationships, multicollinearity must be checked to ensure it does not distort the regression results. In the PLS-SEM analysis method, the VIF (variance inflation factor) index is applied to identify multicollinearity.

The analysis results (*Table 2*) show that the VIF index of all observed variables is less than 3, indicating that multicollinearity issues do not occur among the observed variables of the study. The VIF index of all factors is less than 1.624 (*Table 4*), indicating that multicollinearity issues do not occur among the independent variables of the study.

Most researchers use the P-value to assess significance. A coefficient is statistically significant depending on its standard error obtained through the bootstrapping method. The bootstrap standard error allows the calculation of the P-value for all path coefficients in the structural model. In business, researchers often choose a significance level of 5%. Assuming a significance level of 5%, the P-value must be less than 0.05 to conclude that the relationship under consideration is statistically significant at the 5% level. The bootstrapping results include standardized impact coefficients and P-values of the hypotheses.

The SEM model analysis results show that this study supports hypotheses H1 and H2 regarding the impact of perceived usefulness and perceived risk on the intention to use m-commerce, with impact coefficients of 0.499 and -0.353, respectively, within the 95% confidence interval. The results also support the important role of knowledge and self-efficacy on the two cognitive components, with impact coefficients of 0.265, -0.168, 0.237, and -0.133, respectively, within the 95% confidence interval, accepting hypotheses H3, H4, H5, and H6. Unlike the two aforementioned antecedents, trust propensity only affects perceived usefulness, while security protection and privacy protection only affect perceived risk, with impact coefficients of 0.122, -0.248, and -0.13, respectively, accepting hypotheses H7, H10, and H12. However, the analysis results do not support hypotheses H8, H9, and H11 regarding the impact of trust propensity on perceived risk, security protection, and privacy protection on perceived usefulness, as the impact coefficients fall outside the 95% confidence interval.

Table 3: Measurement model testing results

	Hypothesis	Std. coefficient	P-value	Result	Inner VIF index	f^2 index	Effect level
H1	PU -> IU	0.499	0.000	Accepted	1.030	0.427	Large
H2	PR -> IU	-0.353	0.000	Accepted	1.030	0.213	Medium
H3	KN -> PU	0.265	0.000	Accepted	1.212	0.077	Small
H4	KN -> PR	-0.168	0.007	Accepted	1.212	0.030	Small
H5	SE -> PU	0.237	0.000	Accepted	1.346	0.056	Small
H6	SE -> PR	-0.133	0.015	Accepted	1.346	0.017	Very Small
H7	PT -> PU	0.122	0.019	Accepted	1.173	0.018	Very Small
H8	PT -> PR	0.015	0.720	Rejected	1.173	0.000	
H9	SP -> PU	0.032	0.492	Rejected	1.338	0.001	
H10	SP -> PR	-0.248	0.000	Accepted	1.338	0.054	Small
H11	PP -> PU	0.097	0.125	Rejected	1.624	0.008	
H12	PP -> PR	-0.138	0.034	Accepted	1.624	0.016	Very Small

Source: Author's synthesis

The R^2 value (Squared multiple correlations) is the extent to which a variable's variance is explained by a latent factor, explained within each endogenous structure, and thus a measure of the model's explanatory power (Hair et al., 2022). R^2 is also known as the in-sample predictive ability from a measurement perspective, representing the effectiveness of a variable in measuring a concept. R^2 ranges from 0 to 1, with higher values indicating greater explanatory power (Hair et al., 2022).

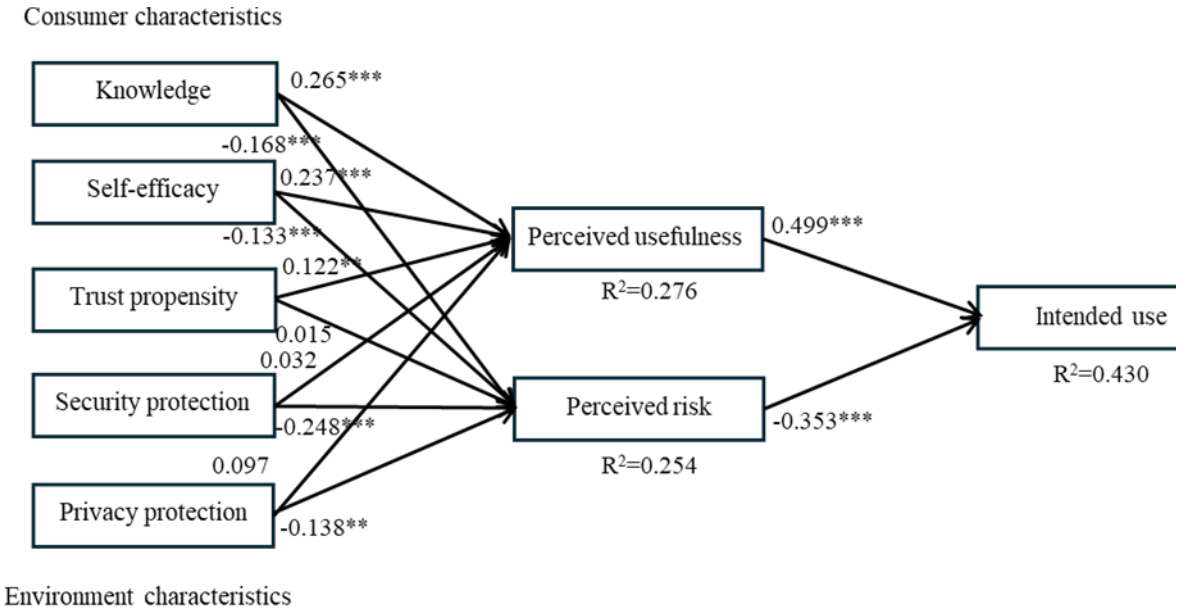

Fig. 2: Proposed research model

In the research model, two factors explaining the intention to use m-commerce are perceived usefulness and perceived risk; these two factors explain 43% of the variance of the dependent variable. For the perceived usefulness factor, knowledge, self-efficacy, and trust propensity together explain 27.6% of the variance. Meanwhile, knowledge, self-efficacy, and security protection explain 25.4% of the variance of perceived risk. The R^2 values of the endogenous variables in the research model range from 0.254 to 0.430, reaching a medium impact level (from 0.25 to 0.50). The variance explained by these endogenous variables is considered sufficient (Hair et al., 2022). Thus, the endogenous variables of the research model, which are perceived usefulness, perceived risk, and intention to use, are sufficiently

explained at a medium level, achieving the initial research objectives.

While the standardized impact coefficient of each path indicates the impact level of each factor on a variable, the f^2 coefficient is used to evaluate the impact effectiveness of each relationship. The f^2 index results (Table 3) show that the impact of trust propensity on usefulness, the impact of self-efficacy, and privacy protection on risk are very small ($f^2 < 0.02$). Meanwhile, the impact of perceived usefulness on the intention to use is strong ($0.35 \leq f^2$), and the impact of perceived risk on the intention to use is moderate ($0.15 \leq f^2 < 0.35$). All other impacts are small ($0.02 \leq f^2 < 0.15$). To measure the predictive ability of the model, Hair et al. (2022) proposed the Q^2 index - the out-of-sample predictive power coefficient. The Q^2 coefficient evaluates the predictive ability of an independent variable for a dependent variable in the structural component model. The Q^2 index results (*Table 5*) show that the Q^2 values range from 0.152 to 0.329, indicating that the independent factors have a medium predictive level ($0.15 \leq Q^2 \leq 0.35$). Additionally, Q^2 is considered an index to evaluate the overall quality of the component model. With the Q^2 values in *Table 5*, the overall structural model of the study achieves overall quality.

Table 4: Model Explanation and Prediction Ability

Code	Endogenous factor	R^2	R^2 adjustment	Q^2 index
PU	Perceived usefulness	0.287	0.276	0.152
PR	Perceived risk	0.264	0.254	0.183
IU	Intention to use	0.433	0.430	0.328

Source: Author's synthesis

5. Discussion

The study has confirmed a comprehensive framework to examine the intention to shop on mobile devices of consumers in Ho Chi Minh City. The study applies the SOR model and the 3M model to clarify the relationship between stimulus factors and the intention to shop on mobile devices through the mediation of cognitive components, including perceived usefulness and perceived risk. In this study, stimulus factors include external and internal stimuli. The group of external stimulus factors includes safety protection and privacy protection from the provider. Knowledge, self-efficacy, and trust propensity are internal stimulus components.

The analysis of the results reveals that perceived usefulness is determined by four observed variables related to the level of improvement in shopping efficiency on mobile devices. Consumers highly appreciate that mobile devices can reduce the time needed for shopping, shopping on mobile devices is useful, shopping on mobile devices can increase work productivity, and help increase the opportunity to complete important tasks. The analysis results show that perceived usefulness has a positive impact on the intention to shop for mobile devices. This result is consistent with the findings of Liu and Mensah (2024), who confirm that Chinese consumers highly appreciate the efficiency of mobile shopping, then promoting the intention to use m-commerce in consumption. According to Mollick et al. (2023), American consumers believe that mobile shopping is more efficient than other forms of shopping, which is the main reason for their increased intention to use m-commerce. These consistent findings across different cultural contexts underscore the critical role of perceived usefulness as a determinant of m-commerce adoption.

Perceived risk focuses on consumers' assessment of the potential damage when shopping on mobile devices. Consumers are concerned that shopping via mobile devices increases financial risk, the risk of not receiving the expected product, and poses a danger to sensitive information. The SEM analysis results show that perceived risk has a negative impact on the intention to use m-commerce among Vietnamese consumers. This finding indicates that consumers harbor substantial apprehension regarding potential financial losses, product non-delivery or discrepancy, and the compromise of sensitive personal information when engaging in mobile transactions. Such concerns about incidents

when transacting on mobile devices make consumers tend not to use m-commerce. This outcome is consistent with the research of Hanif et al. (2022), Liu and Mensah (2024), who argue that consumers may reduce their intention to use m-commerce when their perception of damage related to this shopping method increases. Similarly, Kraiwanit et al. (2024) point out that consumers are particularly concerned about privacy risks and information security risks, which explains why they are likely to refuse to use financial services on mobile devices. Consequently, addressing these pervasive risk perceptions is paramount for fostering widespread m-commerce adoption in Vietnam. Strategies aimed at enhancing transaction security, ensuring product authenticity, and safeguarding user data are crucial to mitigating these concerns and building consumer trust in mobile shopping platforms.

Vietnamese consumers' knowledge is determined by three components: knowledge about mobile devices, usage, and shopping experience on mobile devices. Consumers can gather knowledge about m-commerce by searching and reading information about them on the Internet (Yang, 2013). Similarly, practical experience is also subjective to consumers; some experiences are successful, others are not (Dabrynin & Zhang, 2019). The scale is appropriate and reliable within the Vietnamese context. The analysis results show that knowledge has a negative impact on the perceived risk of m-commerce. This aligns with the finding of Vo and Wu (2022), Shirazi et al. (2022). For Vietnamese consumers, a deeper understanding of m-commerce, including its functionalities and the conduct of sellers and service providers, appears to mitigate feelings of potential loss or negative outcomes. This suggests that as Vietnamese consumers become more digitally literate and experienced with mobile platforms, their apprehension regarding risks associated with online transactions via mobile devices diminishes. This is particularly relevant in an emerging market like Vietnam, where trust in digital platforms is still evolving.

The SEM analysis also demonstrates that knowledge has a positive impact on the perceived usefulness of m-commerce. Yao and Wang (2024) aligned this result, who argue that knowledge helps consumers analyze the core value of products, understand how digital services operate, and predict long-term benefits from using products, then increasing perceived usefulness. Zhu and Kubickova (2023) point out that highly knowledgeable individuals often evaluate products and services not only based on immediate benefits but also consider long-term factors such as compatibility, sustainability, or future performance. This outcome suggests that Vietnamese consumers with greater m-commerce knowledge are more likely to perceive these platforms as sustainable and beneficial in the long run, fostering greater adoption and continued usage. The emphasis on long-term benefits is crucial in a market where consumers are increasingly looking beyond immediate gratification to holistic value.

In the context of Vietnam, the construct of consumer self-efficacy in m-commerce reflects the individual's confidence in their ability to shop on mobile devices, the ability to identify and fix common issues with mobile devices, and the ability to install or remove applications from mobile devices. The scales employed to measure the self-efficacy have been validated and deemed reliable, consistent with prior research by Ha et al. (2025). SEM analysis results show that self-efficacy has a negative impact on the perceived risk of m-commerce. Capistrano et al. (2024) support this result, who argue that loss is less likely to occur when actions are under conditions of confidence in their success. Even if the decision leads to unexpected results, they can solve it themselves without the help of anyone else (Pan et al., 2024). Bartol et al. (2023) argue that consumers who are more confident in their mobile shopping ability believe that they have greater control over all aspects, including potential losses related to the shopping process. Essentially, Vietnamese consumers with higher self-efficacy in mobile device usage and troubleshooting are less apprehensive about potential losses or negative experiences in m-commerce.

The results also demonstrated a positive influence of self-efficacy on the perceived usefulness of m-commerce. This result is consistent with Musyaffi et al. (2024). These authors argue that users who believe in their ability to use mobile devices often highly appreciate the convenience, speed, and flexibility that m-commerce platforms bring. Therefore, enhancing self-efficacy through friendly

interface design and user guidance programs can contribute to promoting the perception of the usefulness of m-commerce (Zhu et al., 2022). For the Vietnamese market, this implies that as consumers become more adept and assured in their mobile technology skills, they are more likely to recognize and appreciate the practical benefits offered by m-commerce. Consequently, strategic interventions aimed at bolstering consumer self-efficacy, such as designing intuitive and user-friendly interfaces, coupled with comprehensive user guidance programs, could significantly contribute to enhancing the perceived usefulness of m-commerce platforms among Vietnamese consumers.

Vietnamese consumers' trust propensity is determined by trust in those around them, trust in human nature, easily trusting someone, and having a tendency to trust a person even though they do not know about them. Trust propensity is important for consumers because they have to perform transactions on mobile devices themselves (Kordzadeh & Bozan, 2024). The scales introduced in the trust propensity measurement model are all appropriate and reliable, as proposed by Liu et al. (2024). The results show that trust propensity has a positive impact on the perceived usefulness of m-commerce for Vietnamese consumers. This finding resonates with previous research (Kordzadeh & Bozan, 2024), who argue that users with high trust propensity will swallow new technologies like m-commerce because these platforms will bring practical benefits. This trust also reduces cognitive barriers to technological complexity, facilitating users to fully exploit features, then perceiving more pronounced usefulness (Zhao et al., 2024).. In a digital environment with many uncertainties and incomplete information, trust propensity helps users decide quickly, overcome doubts, and subjectively evaluate the value of the application (Revillod, 2025). For Vietnamese consumers, this inherent trust likely mitigates initial cognitive barriers associated with technological complexity, enabling them to more readily explore and fully utilize m-commerce features. This underscores the psychological pathway through which generalized trust facilitates the recognition of tangible benefits in a rapidly evolving digital marketplace like Vietnam.

A salient finding from the SEM analysis show that this study does not support the negative impact of trust propensity on perceived risk in m-commerce context among Vietnamese consumers. This outcome deviates from conventional understanding, where a higher propensity to trust typically correlates with lower perceived risk. This unexpected result can be illuminated by several nuanced contextual factors specific to Vietnam. Despite a general cultural inclination towards trust, the evolving nature of Vietnam's legal framework governing m-commerce and the inconsistent levels of transparency across various m-commerce applications likely exert a moderating influence on this relationship. Vietnamese consumers, while possessing a personal disposition to trust, may simultaneously hold an underlying awareness of inherent vulnerabilities within this relatively nascent digital ecosystem. This suggests that systemic or environmental factors, rather than solely individual propensities, play a more dominant role in shaping perceived risk within the specific Vietnamese m-commerce landscape. Consequently, even for individuals with a high trust propensity, the perceived risks stemming from an underdeveloped regulatory environment or platform inconsistencies may outweigh their personal inclination, leading to a persistent perception of risk. This highlights the importance of considering country-specific digital infrastructure and consumer protection mechanisms when examining m-commerce adoption in emerging markets.

Security protection in m-commerce is determined by the mobile platform being regularly maintained and repaired, a secure mobile operating system, a secure mobile shopping platform, and a secure user authentication methods, which are meaningful insights tailored to Vietnam's digital market. The scales are all appropriate and reliable, as proposed by Nguyen et al. (2021). A key discovery from the SEM analysis was the strong negative impact of security protection on perceived risk among Vietnamese consumers engaging in mobile commerce. This finding is consistent with Koh et al. (2024), who argue that when m-commerce platforms deploy strong security protection measures, consumers may feel more secure, then reducing the level of perceived risk. This is consistent with the conclusion of previous studies that consumers do shopping on mobile platforms if the platform can protect their

personal and financial information (AlHassan et al., 2025). In Vietnam, where digital trust remains a critical factor, transparency in security practices appears to significantly reduce concerns, fostering a safer transactional environment.

However, the empirical data results do not support the hypothesis about the positive relationship between security protection and perceived usefulness in m-commerce. While security remains crucial, Vietnamese consumers may prioritize convenience, affordability, and ease of use over advanced security features. If security mechanisms - such as multi-factor authentication - introduce friction into the user experience, they might inadvertently reduce perceived usefulness, particularly for individuals with limited digital literacy or inconsistent internet access. Security fosters trust and indirectly enhances adoption, but it may not directly influence perceived usefulness in Vietnam. For many local users, m-commerce's appeal lies in accessibility, affordability, and efficiency - especially for procuring goods otherwise difficult to obtain through traditional retail channels (Bui et al., 2020). Platform intuitiveness, transaction speed, and product diversity appear to shape perceived usefulness more than security protocols (Mondego & Gide, 2024). Moreover, in emerging economies like Vietnam, consumers may tolerate higher perceived risks when the benefits - such as competitive pricing and broader product selection - outweigh security concerns (Sahli & Sassi, 2020). Thus, security is vital but may play a secondary role in shaping perceived usefulness in Vietnam's evolving digital commerce landscape.

Privacy protection in Vietnamese m-commerce is determined by the mobile platform's concern for user privacy, protection of customer personal information, compliance with personal data protection laws, and unauthorized disclosure of personal information. The scales introduced in the privacy protection measurement model are all appropriate and reliable, as proposed by Zaheer et al. (2024). The SEM analysis results show that privacy protection has a negative impact on the perceived risk of m-commerce for Vietnamese consumers. This aligns with Koh et al. (2024), who argue that when m-commerce platforms provide substantial commitments to protecting personal data, consumers will feel more secure, then reducing the level of perceived risk they perceive. Song et al. (2024) further support this, emphasizing that with businesses applying public and transparent policies on customer data usage, consumer concerns about privacy violations will significantly decrease. In Vietnam, where online fraud and data breaches remain significant worries, robust privacy measures directly alleviate anxieties surrounding data misuse, creating a more secure environment for mobile transactions.

However, the anticipated positive relationship between privacy protection and perceived usefulness was not supported by the data. This suggests a unique dynamic within Vietnam's digital economy. This can be explained by the context of users nowadays being more familiar with digital systems, leading to them no longer viewing privacy protection as a factor that significantly enhances the usefulness of the application, but seeing it as a basic and obvious condition (Zhang, 2024). The study by Amrollahi et al. (2024) points out that privacy is important in terms of trust rather than utility. Users may feel secure knowing their personal data is safe, but this does not make them feel the application is more useful in achieving personal goals (Zhang, 2024). The discrepancy in expectation levels and experience can also lead to users not perceiving added value from privacy protection (Schultz & Kaiser, 2025). Vietnamese users may feel reassured knowing their data is safeguarded, but this does not always translate into the belief that privacy measures make a platform more functional. Thus, privacy remains fundamental to trust-building but indirectly influences m-commerce adoption within Vietnam's evolving digital market.

6. Conclusion

This study investigated how consumer characteristics and platform features influence m-commerce adoption intentions among Vietnamese consumers through an integrated SOR-3M framework. The findings reveal that perceived usefulness and perceived risk serve as critical mediators, with consumer knowledge and self-efficacy playing pivotal roles in shaping these perceptions. Notably, platform security features primarily address risk concerns rather than enhancing perceived utility, suggesting that Vietnamese consumers view security as a baseline requirement rather than a value-added feature.

The study makes several theoretical contributions to the technology acceptance literature. It demonstrates the value of integrating individual difference theories with environmental psychology frameworks to understand technology adoption in specific cultural contexts. The finding that trust propensity affects perceived usefulness but not perceived risk challenges assumptions about the universal nature of trust effects and highlights the importance of cultural context in technology acceptance research. The integration of SOR and 3M models provides a more comprehensive understanding of the complex interplay between individual characteristics and environmental stimuli in shaping technology adoption decisions.

For practitioners, the results suggest that m-commerce platforms targeting Vietnamese consumers should prioritize intuitive design and clear value propositions over extensive security messaging. Educational initiatives that enhance consumer knowledge and self-efficacy may be more effective than comprehensive security communications in driving adoption. Platform designers should focus on demonstrating functional benefits while ensuring that security features operate transparently in the background rather than as prominent selling points.

The study acknowledges several important limitations that constrain the generalizability of findings. The reliance on convenience sampling and cross-sectional design limits causal inferences and representativeness. Data collected from convenience sampling may be biased, which can cause bias in the analysis results, thereby limiting the significance of the model. The focus on Ho Chi Minh City may not adequately represent rural Vietnamese consumers or other emerging market contexts. Cultural factors specific to Vietnam were not explicitly modeled, and the study did not account for potential cohort effects or temporal changes in technology acceptance patterns. Additionally, the relatively small qualitative component limited the depth of understanding about consumer decision-making processes.

Future research should address these limitations through several important directions. Longitudinal designs would better capture the dynamic nature of technology adoption and allow for stronger causal inferences. Probability sampling methods would enhance generalizability, and explicit modeling of cultural variables would advance theoretical understanding of technology acceptance across different contexts. Research should also examine how these relationships evolve as markets mature, investigate the role of social influences in collectivist cultures, and explore how different product categories might moderate these relationships in m-commerce contexts.

References

AlHassan, H. A., Papastathopoulos, A., & Nobanee, H. (2025). Measuring perceived security in FinTech services: developing a dynamic scale. *European Journal of Information Systems*, 1-21.

Amrollahi, A., Kummer, T. F., Rajaeian, M., & Hadinejad, A. (2024). Trust dynamics in sharing economy services during a crisis: A comparison between Airbnb and Uber. *International Journal of Tourism Research, 26*(4).

Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian Journal of Social Psychology, 2*, 21-41.

Bartol, J., Vehovar, V., Bosnjak, M., & Petrovčič, A. (2023). Privacy concerns and self-efficacy in e-commerce: Testing an extended APCO model in a prototypical EU country. *Electronic Commerce Research and Applications, 60*.

Bauer, R. A. (1960). *Consumer Behavior as Risk Taking, Dynamic marketing for a changing world.* Chicago: American Marketing Association.

Bouzaabia, O., Ben Arbia, M., Juárez Varón, D. J., & Chui, K. T. (2024). The Consequences of Gamification in Mobile Commerce Platform Applications. *International Journal on Semantic Web and Information Systems, 20*(1), 1-20. doi:10.4018/ijswis.337599

Bui, N., Pham, L., Williamson, S., Mohebbi, C., & Le, H. (2020). Intention to Use Mobile Commerce: Evidence From Emerging Economies. *International Journal of Enterprise Information Systems, 16*(1), 1-30.

Camoiras, Z., & Varela, C. (2020). The influence of consumer personality traits on mobile shopping intention. *Spanish Journal of Marketing - ESIC, 24*(3), 331-353. doi:10.1108/sjme-02-2020-0029

Canio, F., Fuentes, M., & Martinelli, E. (2022). Extrinsic motivations behind mobile shopping: what drives regular and occasional shoppers? *International Journal of Retail & Distribution Management, 50*(8/9), 962-980. doi:10.1108/ijrdm-10-2021-0489

Capistrano, E. P., Gomez, M. M. E., & Isleta, A. P. M. (2024). Examining trust, self-efficacy, and technology acceptance in the Philippines'e-commerce sectors. *Information Development, 40*(4), 693-717.

Dabrynin, H., & Zhang, J. (2019). The Investigation of the Online Customer Experience and Perceived Risk on Purchase Intention in China. *Journal of Marketing Development and Competitiveness, 13*, 16-31.

Davis, F., Bagozzi, R., & Warshaw, P. (1989). User Acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003. doi:10.1287/mnsc.35.8.982

Dogra, N., & Adil, M. (2024). Should we or should we not? Examining travelers' perceived privacy, perceived security and actual behavior in online travel purchases. *Journal of Vacation Marketing, 30*(1), 123-142.

Featherman, M., & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International Journal of Human Computer Studies, 59*, 451-474. doi:10.1016/S1071-5819(03)00111-3

Gavindra, G. G., Anandya, D., & Indarini, I. (2024). Factors That Influence Intention to Adopt Mobile Shopping in Marketplace. *Andalas Management Review, 7*(2), 37-53.

Gehlbach, H., & Brinkworth, M. E. (2011). Measure twice, cut down error: A process for enhancing the validity of survey scales. *Review of General Psychology, 15*(4), 380–387. doi:https://doi.org/10.1037/a0025704

Ha, M.-T., Vo, V.-B., & Nguyen, V.-V. (2025). Effects of Technology Adaptation and Perceived Value on Continuance Intention in M-commerce of Gen Z: Innovativeness as a Moderator. *SAGE Open, 15*(1). doi:10.1177/21582440251328098

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (3rd Ed.): Sage.

Handoyo, S. (2024). Purchasing in the digital age: A meta-analytical perspective on trust, risk, security, and e-WOM in e-commerce. *Heliyon, 10*(8).

Hanif, M. S., Wang, M., Mumtaz, M. U., Ahmed, Z., & Zaki, W. (2022). What attracts me or prevents me from mobile shopping? An adapted UTAUT2 model empirical research on behavioral intentions of aspirant young consumers in Pakistan. *Asia Pacific Journal of Marketing and Logistics, 34*(5), 1031-1059.

Hengboriboon, L., & Yukongdi, V. (2024). Enhancing Employee Assistance Programs for Stress Management in Thailand: Employees' Perspectives. *SAGE Open, 14*(4).

Huyen, T. T. P. (2024). A Study on Factors Affecting Online Shopping Intention Through Mobile Shopping Applications Of Gen Z: A Case Study In Vietnam. *Research Inventy: International Journal of Engineering And Science, 14*(2), 1-5.

Kakolu, S., & Faheem, M. A. (2024). Building trust with generative AI chatbots: Exploring explainability, privacy, and user acceptance. *Iconic Research And Engineering Journals, 8*(3), 823-834.

Kim, Y., Wang, Q., & Roh, T. (2021). Do information and service quality affect perceived privacy protection, satisfaction, and loyalty? Evidence from a Chinese O2O-based mobile shopping application. *Telematics and Informatics, 56*, 101483. doi:10.1016/j.tele.2020.101483

Koh, L. Y., Xia, Z., & Yuen, K. F. (2024). Consumer acceptance of the autonomous robot in last-mile delivery: A combined perspective of resource-matching, perceived risk and value theories. *Transportation Research Part A: Policy and Practice, 182*, 104008. doi:10.1016/j.tra.2024.104008

Kordzadeh, N., & Bozan, K. (2024). The Influence of the Big Five Personality Traits and Propensity to Trust on Online Review Behaviors: The Moderating Role of Gender. *Journal of theoretical and applied electronic commerce research, 19*(2), 1442-1470. doi:10.3390/jtaer19020072

Kraiwanit, T., Limna, P., & Wattanasin, P. (2024). Digital wallet dynamics: Perspectives on potential Worldcoin adoption factors in a developing country's FinTech Sector. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(2), 100287.

Li, J., Wu, L., Qi, J., Zhang, Y., Wu, Z., & Hu, S. (2023). Determinants Affecting Consumer Trust in Communication With AI Chatbots: The Moderating Effect of Privacy Concerns. *Journal of Organizational and End User Computing, 35*(1), 1-24. doi:https://doi.org/10.4018/JOEUC.328089

Liu, C., Wang, J., Chen, R., & Zhou, W. (2024). Exploring the influence of Chinese online patient trust on telemedicine behavior: insights into perceived risk and behavior intention. *Frontiers in Public Health, 12*, 1415889.

Liu, Y., Lu, X., Zhao, G., Li, C., & Shi, J. (2022). Adoption of mobile health services using the unified theory of acceptance and use of technology model: Self-efficacy and privacy concerns. *Frontiers in Psychology, 13*.

Liu, Y., & Mensah, I. K. (2024). Using an extended technology acceptance model to understand the behavioral adoption intention of mobile commerce among Chinese consumers. *Information Development*. doi:10.1177/02666669241277153

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.

Mgiba, F. M., & Shukla, S. (2024). Invasiveness, privacy concerns and mobile banking services technology adoption by millennials: Emerging economy perspective. *South African Journal of Business Management, 55*(1). doi:https://doi.org/10.4102/sajbm.v55i1.4174

Mollick, J., Cutshall, R., Changchit, C., & Pham, L. (2023). Contemporary Mobile Commerce: Determinants of Its Adoption. *Journal of theoretical and applied electronic commerce research, 18*(1), 501-523. doi:10.3390/jtaer18010026

Mombeuil, C., & Uhde, H. (2021). Relative convenience, relative advantage, perceived security, perceived privacy, and continuous use intention of China's WeChat Pay: A mixed-method two-phase design study. *Journal of Retailing and Consumer Services, 59*, 102384.

Mondego, D., & Gide, E. (2024). The impact of security, service quality, perceived usefulness, perceived ease of use, trust, and price value on users' satisfaction in cloud-based payment systems in Australia: A PLS-SEM analysis. *Journal of Information Systems and Technology Management, 21*.

Musyaffi, A. M., Adha, M. A., Mukhibad, H., & Oli, M. C. (2024). Improving students' openness to artificial intelligence through risk awareness and digital literacy: Evidence form a developing country. *Social Sciences & Humanities Open, 10*, 101168.

Nguyen, D. D., Nguyen, T. D., Nguyen, T. D., & Nguyen, H. V. (2021). Impacts of perceived security and knowledge on continuous intention to use mobile Fintech payment services: An empirical study in Vietnam. *The Journal of Asian Finance, Economics and Business, 8*(8), 287-296.

Pan, Z., Xie, Z., Liu, T., & Xia, T. (2024). Exploring the key factors influencing college students' willingness to use AI coding assistant tools: An expanded technology acceptance model. *Systems, 12*(5), 176.

Piroth, P., Ritter, M. S., & Rueger-Muck, E. (2020). Online grocery shopping adoption: do personality traits matter? *British Food Journal, 122*(3), 957-975. doi:10.1108/bfj-08-2019-0631

Revillod, G. (2025). Trust influence on AI HR tools perceived usefulness in Swiss HRM: the mediating roles of perceived fairness and privacy concerns. *AI & SOCIETY*(1-34).

Sahli, A., & Sassi, H. (2020). Perceived risk, structural assurance and trust in mobile payments. *Journal of Telecommunications and the Digital Economy, 10*(4), 41-56.

Schultz, C. D., & Kaiser, S. (2025). Consumer value dimensions in conversational and mobile commerce. *Journal of Marketing Analytics*. doi:10.1057/s41270-025-00383-w

Shaw, N., & Sergueeva, K. (2019). The non-monetary benefits of mobile commerce: Extending UTAUT2 with perceived value. *International Journal of Information Management, 45*, 44-55. doi:10.1016/j.ijinfomgt.2018.10.024

Shirazi, F., Hajli, N., Sims, J., & Lemke, F. (2022). The role of social factors in purchase journey in the social commerce era. *Technological Forecasting and Social Change, 183*, 121861.

Song, B., Xu, H., Hu, W., Li, Y., & Guo, Y. (2024). How to calculate privacy: privacy concerns and service robots' use intention in hospitality. *Current Issues in Tourism, 27*(21), 3401-3417.

Tarhini, A., Alalwan, A. A., Shammout, A. B., & Al-Badi, A. (2019). An analysis of the factors affecting mobile commerce adoption in developing countries. *Review of International Business and Strategy, 29*(3), 157-179. doi:10.1108/ribs-10-2018-0092

Trinh, H. N., Tran, H. H., & Vuong, D. H. Q. (2020). Determinants of consumers' intention to use credit card: a perspective of multifaceted perceived risk. *Asian Journal of Economics and Banking, 4*(3), 105-120. doi:10.1108/AJEB-06-2020-0018

Vo, H. G., & Wu, K. (2022). Exploring Consumer Adoption of Mobile Shopping Apps From a Perspective of Elaboration Likelihood Model. *International Journal of E-Services and Mobile Applications, 14*(1), 1-18. doi:10.4018/ijesma.296577

Yamane, T. (1973). *Statistics: An Introductory Analysis. 3rd Edition*: Harper & Row Ltd., New York.

Yao, N., & Wang, Q. (2024). Factors influencing pre-service special education teachers' intention toward AI in education: Digital literacy, teacher self-efficacy, perceived ease of use, and perceived usefulness. *Heliyon, 10*(14), e34894.

Zaheer, M. A., Anwar, T. M., Khan, Z., Raza, M. A., & Hafeez, H. (2024). How do strategic attributes of electronic commerce impel the perceived value and electronic loyalty of online food delivery applications (OFDAs). *Journal of Innovative Digital Transformation, 1*(1), 48-67.

Zhang, Y. (2024). Impact of perceived privacy and security in the TAM model: the perceived trust as the mediated factors. *International Journal of Information Management Data Insights, 4*(2).

Zhao, H., Khaliq, N., Li, C., Rehman, F. U., & Popp, J. (2024). Exploring trust determinants influencing the intention to use fintech via SEM approach: Evidence from Pakistan. *Heliyon, 10*(8).

Zhu, G., & Kubickova, M. (2023). Reputation, familiarity and use intention for e-payment services: a comparison of pure-play and click-and-mortar e-payment services. *Journal of Quality Assurance in Hospitality & Tourism, 24*(2), 169-191.

Zhu, G., Zheng, J., & Chen, Y. (2022). Acceptance of free-floating car sharing: A decomposed self-efficacy-based value adoption model. *Transportation Letters, 14*(5), 524-534.