THE ROLE OF PRIVACY ON CONTINUED USAGE INTENTION OF MOBILE BANKING IN VIETNAM

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1. Introduction

Mobile banking (m-banking), a critical self-service technology, is reshaping the global financial sector, substantiated by an estimated worldwide investment of $115 billion designed to enhance customer relationships and secure a competitive edge (Bahram Foroughi, Mohammad Iranmanesh & Sunghyup Sean Hyun, 2019; Chayawan Poromatikul, Peter De Maeyer, Kannika Leelapanyalert & Simon Zaby, 2020). The ultimate success of this extensive investment, however, is determined not by initial adoption but by users' continued usage intention (CUMB) (Anol Bhattacherjee, 2001; Mousa Albashrawi & L. Motiwalla, 2017). This emphasis on retention is particularly vital in Vietnam, a nation experiencing rapid digital transformation yet harboring significant customer apprehension; a 2023 survey revealed that 65% of Vietnamese customers are concerned about information security (Thi Kim Lien Hoang & Vannam Le, 2024). Therefore, the assurance of privacy is a paramount requirement for maintaining user trust in sensitive digital transactions (Jungho Kang, 2018). The existing literature on post-adoption behavior is typically structured around the Technology Continuance Theory (TCT) (Chao Liao, Peter Palvia & Jen-Her Chen, 2009), which incorporates core elements from the Technology Acceptance Model (TAM) (Fred D. Davis, 1989) and the Expectation-Confirmation Model (Anol Bhattacherjee, 2001). Research consistently affirms that post-adoption factors such as satisfaction, expectation confirmation, and perceived usefulness (PU) are influential predictors of continued usage (Foroughi et al., 2019; Poromatikul et al., 2020; Shang-Ming Yuan, Yong Liu, Ruonan Yao & Jian Liu, 2016).

Despite the importance of guaranteed security as a purported advantage of mobile banking applications (KPMG, 2020), dominant post-adoption models often overlook critical factors prevalent in the modern, data-intensive environment (Hong, Thong & Tam, 2006; Gai et al., 2018; Yuan et al., 2016). Specifically, factors related to perceived privacy security have been insufficiently explored as direct antecedents of continuance intention (Lan-Xiang Yin & Hsien-Cheng Lin, 2022). Given that m-banking operates in a human-computer interaction context (D. L. Hoffman & T. P. Novak, 1996), incorporating dimensions like human-information interaction is vital for fully capturing user interaction behavior (Lu et al., 2010; Lu et al., 2017). This context creates the personalization-privacy paradox, a core conflict where the benefits derived from highly customized services directly clash with user concerns over the necessary disclosure of personal data (Helen Xu, Xin Luo, John M. Carroll & Mary Beth Rosson, 2011; Sutanto et al., 2013; Park, 2014). Furthermore, findings regarding the impact of perceived risk, which includes privacy and financial uncertainties (Mauricio S. Featherman & Paul A. Pavlou, 2003), remain inconsistent, demonstrating varying levels of significance across different continuance studies (Chen, 2012; Kumar & Ravindran, 2012; Yuan et al., 2016). To overcome these theoretical limitations and provide a specialized understanding for the Vietnamese market, this study extends the established

framework to explicitly integrate Privacy and Personalization (Albashrawi & Motiwalla, 2019) as central factors driving CUMB.

2. Theoretical Framework

The research model for this study, depicted in Figure 1, investigates the factors influencing the Continued Usage Intention of Mobile Banking (CUMB) in Vietnam. The framework is fundamentally grounded in the Technology Continuance Theory (TCT) (Liao, Palvia & Chen, 2009), which provides a comprehensive understanding of post-adoption behavior by integrating core constructs from the Technology Acceptance Model (TAM) (Fred D. Davis, 1989) and the Expectation-Confirmation Model (ECM) (Anol Bhattacherjee, 2001; Bahram Foroughi, Mohammad Iranmanesh & Sunghyup Sean Hyun, 2019). While TAM explains initial acceptance through cognitive beliefs like usefulness and ease of use, ECM emphasizes the role of user satisfaction as a critical determinant of continuance intention (Bhattacherjee, 2001; Foroughi et al., 2019; Kshitiz Jangir, Vikas Sharma, Sanjay Taneja & Ramona Rupeika-Apoga, 2023). Recognizing that these dominant models often do not account for critical factors in the modern digital environment (Nguyen & Dao, 2024), this study extends the framework by incorporating Privacy and Personalization, which are pertinent determinants of satisfaction and continued usage (Mousa Albashrawi & L. Motiwalla, 2019; Atmaji & Tjhin, 2022).

Continued Usage Intention of Mobile Banking (CUMB)

The dependent variable of this study is the Continued Usage Intention of Mobile Banking (CUMB), defined as a user's intent to continue using the m-banking service after the initial adoption phase (Bhattacherjee, 2001; Albashrawi & Motiwalla, 2019; Ansori & Nugroho, 2024). The long-term viability and success of an information system, along with the ability for banks to recover their substantial investments in m-banking platforms, depend on its continued use rather than first-time adoption (Foroughi et al., 2019; Jangir et al., 2023). Research shows that retaining current customers is more cost-effective and that loyal customers generate more revenue (Atika Dwi Andani & Farid Hidayat, 2022), highlighting the strategic importance of understanding the drivers of continuance (Albashrawi & Motiwalla, 2019). This is supported by industry data showing significantly lower attrition rates among mobile banking customers (4.9%) compared to those who do not use the service (13.9%) (Chayawan Poromatikul, Peter De Maeyer, Kannika Leelapanyalert & Simon Zaby, 2020).

Perceived Usefulness (PU)

Perceived Usefulness (PU) is a core construct of TAM, defined as the degree to which an individual believes that using a particular system would enhance their task performance (Davis, 1989; Foroughi et al., 2019; Syed Ali Raza, Amna Umer & Nida Shah, 2017). In the m-banking context, PU (often equated with Performance Expectancy in UTAUT-based models) assesses the extent to which the service improves the efficiency of conducting financial transactions, such as enabling quick access to banking services or enhancing productivity with financial activities (Davis, 1989; Albashrawi & Motiwalla, 2019; Evon M. Abu-Taieh, Issam AlHadid, Sabah Abu-Tayeh, Ra'ed Masa'deh, Rami S. Alkhawaldeh, Sufian Khwaldeh & Ala'aldin Alrowwad, 2022). When users perceive an m-banking application as useful for their needs, their satisfaction with the service increases, which in turn fosters trust and continuance (Atmaji & Tjhin, 2022). Numerous studies in contexts similar to m-banking, including online banking and mobile internet, have found that PU plays a major role in determining customer satisfaction (Bhattacherjee, 2001; Albashrawi & Motiwalla, 2019). Therefore, this study posits that:

- *H1: Perceived Usefulness is positively related to Customer Satisfaction in mobile banking.*

Perceived Ease of Use (PEU)

Perceived Ease of Use (PEU), another fundamental construct from TAM, is defined as the degree to which an individual believes that using a particular system would be free of effort (Davis, 1989; Raza et al., 2017; Siti Munfaqiroh, Leonardo Calvin Pareira & Bunyamin, 2025). For m-banking, this involves perceptions of the application being user-friendly, clear, understandable, and easy to become skillful at using (Davis, 1989; Albashrawi & Motiwalla, 2019). A system that is easy to navigate and operate reduces cognitive load and enhances the user experience, which is a key component of satisfaction (Jee-Won Kang & Young Namkung, 2019). Prior research has consistently shown that PEU is a significant predictor of satisfaction with information systems and mobile technologies (Albashrawi & Motiwalla, 2019). However, its role in *continuance* (post-adoption) is nuanced; some studies suggest that as users gain experience and familiarity, the direct impact of PEU on satisfaction and continuance intention diminishes, with its effect being fully mediated by other factors like usefulness (Foroughi et al., 2019; Raza et al., 2017). Despite this, its foundational role in shaping the user experience remains crucial. This leads to the following hypothesis:

- *H2: Perceived Ease of Use is positively related to Customer Satisfaction in mobile banking.*

Privacy (PY)

Privacy in the context of m-banking reflects the extent to which an individual feels they have control over their personal information during interactions with the service (Albashrawi & Motiwalla, 2019). It is a critical security challenge that involves protecting users' payment information and transaction patterns from being accessed or shared without authorization (Jungho Kang, 2018; Danial Javaheri, Mahdi Fahmideh, Hassan Chizari, Pooia Lalbakhsh & Junbeom Hur, 2023). This construct is particularly relevant in Vietnam, where a recent survey revealed that 65% of banking customers are concerned about information security when using digital banking services (Thi Kim Lien HOANG & Vannam LE, 2024). A lack of control, or a high perception of security and privacy risk, can elevate user apprehension and negatively impact user attitudes and behaviors (Albashrawi & Motiwalla, 2019; Apau & Lallie, n.d.). Users' perceptions of security are strongly influenced by factors like perceived control and interface design features (Jiaxin Zhang, Yan Luximon & Yao Song, 2019). Studies suggest that when privacy concerns are high, user satisfaction with m-banking services decreases, which in turn may reduce continuance intention (Albashrawi & Motiwalla, 2019). Therefore, this study hypothesizes:

- *H3: Privacy concerns are negatively related to Customer Satisfaction in mobile banking.*

Personalization (PR)

Personalization is the ability of a service to provide tailored offerings to users based on their individual behaviors, preferences, and needs (Albashrawi & Motiwalla, 2019; Kang & Namkung, 2019). In m-banking, this can include customizing the user interface, providing relevant information, and offering convenient services that align with a user's transaction history (Albashrawi & Motiwalla, 2019). This aligns with the concept of "perceived digital value," where customization enhances the user's functional and hedonic experience (Ratyuhono Linggarnusantra Putra, Margono Setiawan, Ananda Sabil Hussein & Agung Yuniarinto, 2022). By making financial transactions quicker and easier, personalized services can make users more efficient and effective, leading to higher satisfaction (Albashrawi & Motiwalla, 2019). This is central to the "privacy calculus" perspective, where users trade personal data for such benefits (Kang & Namkung, 2019). Research has consistently shown that personalization increases customer satisfaction, loyalty, and continued usage of IT services (Albashrawi & Motiwalla, 2019). Accordingly, we propose:

- *H4: Personalization is positively related to Customer Satisfaction in mobile banking.*

The Mediating Role of Customer Satisfaction (CS)

Customer Satisfaction (CS) refers to a user's overall feeling of contentment with the services provided by an m-banking application after using it (Albashrawi & Motiwalla, 2019). It serves as the primary mediator in the research model, channeling the effects of the antecedent constructs onto the final dependent variable. This mediating role is a central tenet of post-adoption theories like ECM and TCT, which posit that cognitive beliefs (like PU, PEU) and post-usage evaluations (like confirmation of privacy and personalization benefits) shape an affective response (satisfaction), which in turn drives behavioral intention (Bhattacherjee, 2001; Poromatikul et al., 2020; Jangir et al., 2023). Satisfied consumers are more likely to continue using a service (Andani & Hidayat, 2022) and less likely to switch to competing alternatives (Albashrawi & Motiwalla, 2019). Based on this strong theoretical and empirical support, we hypothesize:

- *H5: Customer Satisfaction is positively related to Continued Usage Intention of Mobile Banking (CUMB).*

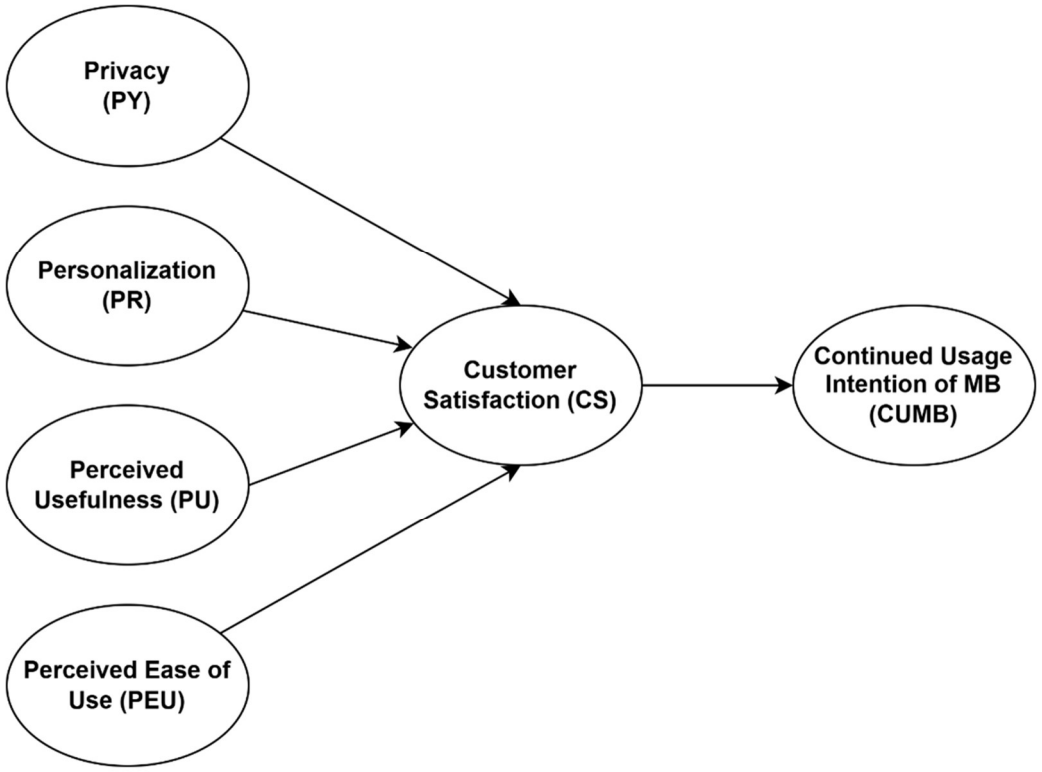

Figure 1. The Proposed Research Model

3. Research Method

Research Process

The research design adopted a two-phase approach, commencing with (1) a preliminary qualitative investigation, followed by (2) a formal quantitative analysis.

In the preliminary phase, a draft measurement scale was developed. This scale was primarily grounded in the Technology Continuance Theory (TCT), integrating core constructs from the Technology Acceptance Model (TAM) and the Expectation-Confirmation Model (ECM), and was extended to

incorporate the pertinent factors of Privacy and Personalization. Subsequently, the draft scale underwent rigorous refinement through consultations with senior experts in information systems and fintech to bolster its content validity and accuracy. The second phase constituted the formal quantitative research. The refined scale was translated into a standardized 5-point Likert scale. Data collection was executed via a convenience sampling method, with questionnaires administered to respondents in Vietnam who actively used mobile banking applications and demonstrated an intention to continue using such services. A total of 341 valid responses were gathered, derived from an initial survey comprising 20 items. For model testing, the collected data will undergo analysis using Structural Equation Modeling (SEM), implemented through SPSS and AMOS software.

4. Research Results

4.1 Descriptive Statistic

(1) *Gender:* The sample shows a significant gender imbalance, with female respondents dominating at approximately 64.1%, compared to male respondents at 35.3%, and others at 0.6%. (2) *Age:* The majority of respondents fall into the 18-22 years old category, accounting for approximately 74.7%. This is followed by the 23-34 years old group at 19.4%, under 18 years old at 3.5%, and those over 34 at 2.4%. (3) *Education Level:* A Bachelor's degree is the most common education level, representing approximately 85% of the sample. Postgraduate accounts for 8.2%, high school for 5.3%, and college/associate's degree for 1.5%. (4) *Occupation:* The sample is predominantly composed of students, accounting for approximately 54.4% of respondents. Full-time employees represent 26.5%, while freelancers/self-employed make up 8.8%. Part-time employees account for 7.1%, business owners for 1.8%, and retirees for 0.3%. Other occupations collectively represent 1.2% of the sample. (5) *Monthly Income:* The largest income group is those earning under 5 million VND, representing 53.5% of respondents. This is followed by the 5–under 10 million VND group at 28.5%, and the 10–under 20 million VND group at 14.4%. Higher income brackets are less common, with 20–30 million VND accounting for 2.4%, and those earning above 30 million VND representing just 1.2% of the sample. (6) *Bank Usage (multi-choice):* State-owned banks are the most widely used, by approximately 62.1% of respondents. Commercial joint-stock banks are also highly utilized by around 60% of the sample, while foreign-owned banks are used by approximately 6.2%. Other types of banks account for the remaining 2.1%. The detail of descriptive statisticis presented in Table 1.

Table 1. Project characteristics

Characteristics	Frequency (n=341)	Percentage (%)
Gender		
- Male	121	35.5
- Female	218	63.9
- Other	2	6
Age		
- Under 18 years old	13	3.8
- 18-22 years old	254	74.5
- 23-34 years old	66	19.4

- Over 34 years old	8	2.3
Education Level		
- High school	18	5.3
- College/associate	6	1.8
- Bachelor	289	84.8
- Postgraduate	28	8.2
Occupation		
- Freelancers	30	8.8
- Full-time employee	90	26.4
- Part-time employee	25	7.3
- Business owner	6	1.8
- Student	185	54.3
- Retiree	1	3
- Other occupations	4	1.2
Monthly Income		
- Under 5 million VND	182	53.4
- 5 - under 10 million VND	97	28.4
- 10-under 20 million VND	50	14.7
- 20 - under 30 million VND	8	2.3
- Over 30 million VND	4	1.2
Bank Usage (multi-choice)		
- Commercial joint-stock banks	205	60.1
- State-owned banks	212	62.2
- Foreign-owned banks	21	6.2
- Other types of banks	7	2.1

4.2 Model and Hypotheses Testing

Exploratory Factor Analysis. First, a reliability analysis was conducted on the 20 measurement items. All scales demonstrated strong internal consistency. As presented in Table 2, the Cronbach's alpha coefficients for all constructs ranged from 0.748 to 0.920, all of which are well above the recommended 0.70 threshold. All 20 items were retained for the factor analysis, as no items demonstrated poor correlation.

Next, an exploratory factor analysis (EFA) with 20 indicators was conducted, and the results are presented in a rotated component matrix (Table 2). The analysis confirmed the proposed six-factor structure, as all items loaded cleanly and significantly onto their intended theoretical constructs. As shown in Table 2, all factor loadings were high, ranging from 0.712 to 0.873, and no significant cross-loadings were found.

This analysis validated the original conceptualization of the six components (PU, PEU, PY, PR, CS, and CUMB). Since the EFA confirmed the original factor structure without any items being regrouped, the original hypotheses (H1, H2, H3, H4, and H5) were maintained for subsequent testing.

Total variance extracted (VE) was sufficient, as all six components registered eigenvalues greater than 1.0. As detailed in Table 2, these factors collectively explain 66.5% of the total variance in the data. Hence, after EFA, the final measurement scales of the adjusted model include 6 components: Perceived Usefulness (PU), Perceived Ease of Use (PEU), Privacy (PY), Personalization (PR), Customer Satisfaction (CS), and Continued Usage Intention of MB (CUMB) with 20 observed variables. The reliability analysis and EFA are presented in Table 2.

Table 2. The summary of reliability and exploratory factor analysis

Factors/Indicators			Analysis results		
			EFA loading	Cronbach alpha	Eigenvalues
	Perceived Usefulness			0.829	4.948
PU	- PU3	- Speed	- 0.808		
	- PU2	- Performance	- 0.790		
	- PU4	- Productivity	- 0.764		
	- PU1	- Useful	- 0.722		
	Perceived Ease of Use			0.878	2.091
PEU	- PEU3	- Clear	- 0.763		
	- PEU2	- Convenient	- 0.756		
	- PEU5	- Skillful	- 0.749		
	- PEU1	- Easy	- 0.722		
	- PEU4	- Flexible	- 0.712		
	Privacy			0.920	1.968
PY	- PY1	- Misuse	- 0.833		
	- PY3	- Sharing	- 0.831		
	- PY2	- Breach	- 0.728		
	Personalization			0.802	1.544
PR	- PR1	- Services	- 0.844		
	- PR3	- Convenience	- 0.816		
	- PR2	- Information	- 0.791		
	Customer Satisfaction			0.804	1.427
CS	- CS1	- Satisfaction	- 0.873		
	- CS2	- Expectation	- 0.857		
	Continued Usage Intention of MB			0.748	1.323
CUMB	- CUMB1	- Continue	- 0.798		
	- CUMB3	- Increase	- 0.786		
	- CUMB2	- Preference	- 0.776		

Regression Analysis. The regression equation representing the relationship between the independent components and Customer Satisfaction (CS) is written by the following formula:

$$Y_{cs} = \beta_0 + \beta_1 X_{pu} + \beta_2 X_{peu} + \beta_3 X_{py} + \beta_4 X_{pr} + \varepsilon_{cs} \quad (1)$$

Y_{cs}: CS value; X_{pi}: PU, PEU, PY, PR; β_{pi}: regression coefficient; ε_{cs}: random error.

The regression equation representing the relationship between CS and Continued Usage Intention of MB (CUMB) is written by the following formula:

$$Y_{cumb} = \beta_0 + \beta_1 X_{cs} + \varepsilon_{cumb} \quad (2)$$

Y_{cumb}: CUMB value; X_{cs}: CS; β_{ej}: regression coefficient; ε_{cumb}: random error.

The regression analysis results are presented in Table 3. According to Table 3 and formula (1), the analysis shows that the factors PU and PY have a positive and statistically significant effect on CS, with β equaling 0.203 (level of statistical significance, ρ = 0.011) and 0.206 (ρ = 0.014) respectively. However, the relationships for PEU (β = 0.109, ρ = 0.184) and PR (β = 0.030, ρ = 0.680) were not found to be statistically significant. Hence, H1 and H3 are supported, while H2 and H4 are not supported. The determination coefficient for this model (R^2_{cs}) is 0.161. The regression equation of CS is written by the following:

$$CS = 0.203(PU) + 0.109(PEU) + 0.206(PY) + 0.030(PR) + \varepsilon_{cs} \quad (3)$$

Table 3. The summary of regression analysis and hypothesis testing results

Model			*β*	SE	*t*	*p-value*	Result
(1)	*H2*	PEU→ CS	0.109	0.088	1.329	0.184	*Not Supported*
	H4	PR → CS	0.030	0.068	0.413	0.680	*Not Supported*
	H1	PU → CS	0.203	0.079	2.541	0.011	*Supported*
	H3	PY → CS	0.206	0.080	2.468	0.014	*Supported*
(2)	*H5*	CS → CUMB	0.266	0.069	3.552	***	*Supported*
R^2_{cs} = 0.161; R^2_{cumb} = 0.071							

****p* = 0.000

According to Table 3 and formula (2), the regression analysis results show that CS has a positive and significant effect on Continued Usage Intention of MB (CUMB) with β = 0.266 (level of statistical significance, ρ < 0.001), leading to support of H5. The determination coefficient for this model (R^2_{cumb}) is 0.071. Thus, the regression equation of CUMB is written by the following:

$$CUMB = 0.266(PU) + \varepsilon_{cumb} \quad (4)$$

In addition, the *t* test values for all supported hypotheses are qualified (level of statistical significance, $\rho < 0.05$), with the Customer Satisfaction (CS) to Continued Usage Intention of MB (CUMB) path achieving $\rho - value = 0.000$. The determination coefficient – adjusted R square of Customer Satisfaction (R^2_{cs}) and Continued Usage Intention of MB (R^2_{cumb}) are 0.161 and 0.071 respectively. The path analysis result provides that the total determination coefficient is $R^2_{total} \approx 0.220$ (or ≈0.221). So the regression equations, formulas (3) and (4), conform to the data that can be used. The adjusted model to explain the Continued Usage Intention of Mobile Banking is depicted in Figure 1.

Path Analysis. According to Pedhazur, path analysis is an extension of multivariate regression analysis. The total determination coefficient – adjusted R square (R^2) of the model is calculated by following formula:

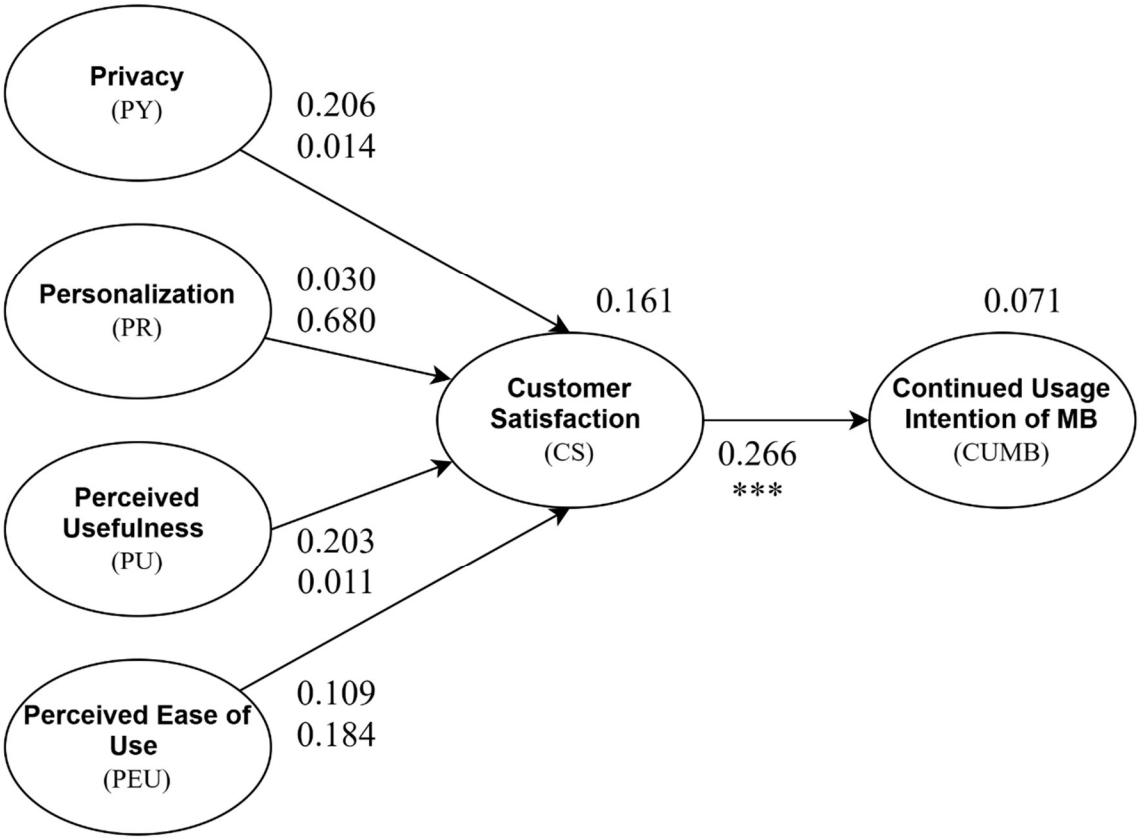

Figure. 1. The success of CUMB – adjusted model

$$R^2 = 1 - (1 - R_{cs}^2)(1 - R_{cumb}^2) \quad (5)$$

Consequently, according to Table 3 and the formula above, the path analysis result:

$$R^2 = 1 - (1 - 0.161)(1 - 0.071) \approx 0.220 \quad (6)$$

According to the formula and the calculation, the path analysis result provides that total determination coefficient $R^2 \approx 0.220$, which means that the independent variables (Perceived Ease of Use (PEU), Personalization (PR), Perceived Usefulness (PU), Privacy (PY)) and the intermediate variable (Customer Satisfaction (CS)) can explain about 22.0 % of the variation in the dependent variable (Continued Usage Intention of MB (CUMB)).

These factors (PU and PY) have positive impacts on Customer Satisfaction (CS). Specifically, the strongest influence on CS is from Privacy ($\beta = 0.206$), while the weakest influence is from Personalization ($\beta = 0.030$). Customer Satisfaction (CS) has a strong positive effect on Continued Usage Intention of MB (CUMB) ($\beta = 0.266$). Generally, the research results provide that three hypotheses (H1, H3, and H5) are supported, while H2 and H4 are not supported.

4.3 Discussions

The preliminary analyses demonstrate strong psychometric properties of the measurement instrument. All constructs exhibited robust internal consistency with Cronbach's alpha values ranging from 0.748 to 0.920, well exceeding the recommended 0.70 threshold, confirming the reliability of the scales. The exploratory factor analysis successfully extracted six distinct factors with eigenvalues greater than 1.0, collectively explaining 66.5% of total variance. All factor loadings ranged from 0.712 to 0.873 with no significant cross-loadings, validating the original theoretical conceptualization of the six components (PU, PEU, PY, PR, CS, and CUMB). Notably, the factor structure remained intact without requiring any items to be regrouped or merged, indicating that the quality dimensions maintained their theoretical distinctiveness. This clean factor structure allowed the research model to proceed without modification, preserving the original hypotheses for subsequent testing.

The regression and path analysis revealed nuanced relationships among the constructs, with significant implications for understanding mobile banking continuance in Vietnam. Contrary to traditional Technology Acceptance Model predictions, only Perceived Usefulness ($\beta = 0.203$, $p = 0.011$) and Privacy ($\beta = 0.206$, $p = 0.014$) emerged as significant predictors of Customer Satisfaction, supporting H1 and H3, while Perceived Ease of Use ($\beta = 0.109$, $p = 0.184$) and Personalization ($\beta = 0.030$, $p = 0.680$) showed no significant effects, leading to rejection of H2 and H4. The particularly strong influence of Privacy on satisfaction underscores the critical importance of data security concerns among Vietnamese users, aligning with survey findings that 65% of customers are apprehensive about information security. Customer Satisfaction demonstrated a significant positive effect on Continued Usage Intention ($\beta = 0.266$, $p < 0.001$), confirming H5 and supporting the mediating role proposed in the Technology Continuance Theory. The model's total explanatory power ($R^2 \approx 0.220$) indicates that these factors account for approximately 22% of variance in continuance intention, suggesting that while privacy and usefulness are important drivers, other contextual factors may also influence users' decisions to continue using mobile banking services in Vietnam.

5. Conclusions and Future Work

References