DOI:10.15625/vap.2025.0047

DETERMINANTS OF USER SATISFACTION WITH PERSONAL FINANCIAL MANAGEMENT APPS AMONG YOUTH IN VIETNAM: EVIDENCE BASED ON THE CUSTOMER PERCEIVED VALUE MODEL

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ABSTRACT

Research purpose: The purpose of this research is to identify and measure the factors affecting user satisfaction with Personal Financial Management Applications (PFMAs) in Vietnam, utilizing the Customer Perceived Value Model. By focusing on the unique socio-economic context of Vietnam, the study provides insights into user experience and fostering financial literacy within the country's digital financial ecosystem.

Research motivation: The research is motivated by the rapid growth of the PFMAs market in Vietnam and the increasing need to understand user satisfaction in this emerging sector. By addressing the gap in market-specific studies, the research seeks to provide valuable insights to enhance user experience and tailor PFMAs to the needs of Vietnamese consumers.

Research design, approach, and method: Online questionnaire survey was delivered to collect data from 224 PFMA users in Vietnam. Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software was used to identify and measure impacts of factors influencing user satisfaction.

Main findings: The main findings of the study reveal that user satisfaction with Personal Financial Management Applications (PFMAs) in Vietnam is significantly influenced by perceived benefits and sacrifices, both directly and indirectly through perceived value. User convenience positively correlates with satisfaction, while perceived risks negatively impact it. Although user control and effort do not directly affect satisfaction, they influence perceived value, which in turn positively affects user satisfaction. The research highlights the importance of perceived value as a mediator and suggests that improving perceived value can enhance user satisfaction indirectly.

Practical/Managerial implications: The findings suggest that PFMA developers should focus on enhancing user convenience and minimizing perceived risks to improve user satisfaction. Additionally, increasing perceived value through better user engagement and benefits can further boost satisfaction.

Keywords: *Personal Financial Management Apps, customer value theory, perceived value, user satisfaction, Vietnam.*

1. INTRODUCTION

The global personal finance software market is projected to reach USD 1.57 billion by 2031, growing at a 5.7% CAGR from 2022 to 2031 (Jha, 2023). This growth is driven by the increasing popularity of Personal Financial Management Applications (PFMAs) worldwide. These apps offer comprehensive tools for budgeting, spending analysis, and financial advice, helping users gain better control over their finances (Cocheo, 2023). Research shows these apps can lead to tangible benefits like reduced overdraft fees and improved financial planning, often using gamification and personalized advice to enhance user engagement and decision-making (Carlin et al., 2023). Financial institutions are recognizing PFMAs' value for customer retention and engagement, with robust offerings positioning banks as central to customers' financial lives, fostering deeper relationships and loyalty (Cocheo, 2023).

Globally, leading apps like Mint, You Need A Budget (YNAB), and PocketGuard offer comprehensive budgeting, expense tracking, and financial planning features. For example, Rocket Money, with over 5 million users globally, provides automated budgeting tools and spending alerts through a freemium model. YNAB, known for its zero-based budgeting approach, allows users to sync accounts, track expenses, and manage savings. Its estimated annual revenue of $49 million highlights the market potential for well-designed PFMAs (Katherine & Cassie, 2024). As financial literacy becomes increasingly important, the demand for innovative and user-friendly PFMAs continues to grow, with new applications emerging to address various financial management needs

Vietnam's remarkable economic growth, driven by industrialization, urbanization, and an expanding middle class, has been accompanied by increased internet and smartphone adoption, setting the stage for digital financial solutions (Tran, 2023). Vietnam's mobile technology has grown rapidly, with smartphone penetration reaching nearly 70% of the population (GSMA, 2023). Consequently, PFMAs are gaining popularity, driven by a young, tech-savvy population and increasing smartphone use. While specific market data is limited, global trends suggest rapid growth in this sector. Leading local apps like Money Lover and MISA MoneyKeeper are tailored to Vietnamese users' needs. Money Lover offers comprehensive expense tracking and financial categorization, providing insights into cash flow patterns and spending habits through detailed charts and reports. MISA MoneyKeeper takes a holistic approach, featuring income and expenditure recording, loan management, budget setting, and spending alerts. It also supports multi-account management, savings tracking, and investment monitoring. Additionally, some banking applications integrate personal financial management functions (Timo).

User satisfaction is crucial for business success, driving customer loyaty (Camilleri & Filieri, 2023; Yoo & Park, 2016), retention, and competitive advantage (Ting & Ping, 2010). Satisfied customers tend to purchase repeatedly, fostering long-term relationships and reducing churn rates (Frederick & W. Earl Sasser, 1990). Furthermore, customer feedback from satisfaction surveys facilitates product and service improvements (Fornell, 1996). Satisfied users also enhances brand reputation and drives innovation through their engagement in positive word-of-mouth marketing and provide valuable feedback for continuous improvement (Zeithaml et al., 1996). In the global market, prioritizing customer needs and satisfaction is essential for maintaining a competitive edge (Alaka, 2015; Ting & Ping, 2010).

User satisfaction with apps is influenced by several key factors. Ashfaq et al. (2020) found that Information Quality (accuracy, relevance, completeness) and Service Quality (reliability, responsiveness, effectiveness) positively influence user satisfaction in chatbots. Hsu and Lin (2023) further refined this by identifying three key dimensions: Core Service Quality (reliability, efficiency, responsiveness), Service Recovery Quality (error handling), and Conversational Quality (natural interactions). Interface usability (Foroughi et al., 2019; Hassenzahl, 2008) and cultural compatibility (Nguyễn Thu Lan, 2024) are crucial determinants of user satisfaction. Security and privacy concerns are growing among users making robust security measures essential for building trust (Ha & Stoel, 2009; Zhou et al., 2010). Kumar et al. (2023) found that customer experiences in various aspects of grocey mobile apps, including ordering, delivery, payment, app search, customer support via chat and mobile, stock availability and product quality, have effects on customer satisfaction. Complexity reduction is another critical factor, with Huh et al. (2009) observing higher satisfaction for tools that simplify finance management. C. Lin et al. (2005) demonstrate that both perceived ease of use and perceived usefulness play crucial roles in user satisfaction and continued usage intentions.

Prior studies have examined factors impacting user satisfaction from different theoretical view points such as the Technology Acceptance Model (Davis, 1989), Expectation Confirmation Theory (Bhattacherjee, 2001; Delone & McLean, 2003; Oliver, 1980), and Customer Perceived Value Model (Blut et al., 2023; Hong et al., 2023; Zeithaml, 1988). In this research, we focus on the model of Customer Value Theory (CVT) because of its relevance to the PFMA context. The Customer Perceived Value Model posits that customer value is a primary driver of user satisfaction, emphasizing users' consideration of benefits and costs as perceived by them. This model highlights the multifaceted nature of value, including three dimensions: functional, emotional, and social (Blut et al., 2023; Hong et al., 2023; Zeithaml, 1988).

Despite extensive research on determinants of user satisfaction in different contexts such as chatbots (Ashfaq et al., 2020; Hsu & Lin, 2023), e-government services (Wang & Liao, 2007), and e-commerce (Chen & Dubinsky, 2003; Pham & Ahammad, 2017), a significant gap exists in market-specific studies of PFMAs in Vietnam. This study attempts to minimize this this gap by examining PFMA user satisfaction factors in Vietnam's unique socio-economic context. Amid rapid technological advancements and increasing mobile app adoption, the study seeks to broaden knowledge in the setting of PFMAs, aligning them with Vietnamese consumers' needs. Thus, two primary research questions are addressed: (1) What factors impact user satisfaction in Vietnam? and (2) To what extent do these factors influence user satisfaction of PFMAs in Vietnam? The scope of the research is limited to the Vietnamese market, with survey participants comprising individuals who have used or are currently using PFMAs in Vietnam.

A quantitative method with data obtained from an online questionnaire survey was employed. Data collected from 224 Personal Financial Management Application (PFMA) users were analyzed using SmartPLS 4 software, employing Partial Least Squares Structural Equation Modeling (PLS-SEM).

This study is structured into five sections. Section 1 outlines the study's background, rationale, and research questions. Section 2 provides relevant literature and theoretical foundation for hypothesis formulation and the conceptual framework. The presentation of research methods is provided in Section 3, followed by data analysis and findings in Section 4. The study concludes with Section 5, which includes discussion of findings, limitations, implications, and suggestions for future research.

2. THEORETICAL FOUNDATION AND HYPOTHESIS DEVELOPMENT

2.1. Customer and user satisfaction

Customer satisfaction, a cornerstone of business success, has been conceptualized by various scholars, each offering unique insights into its nature and measurement. Zeithaml et al. (1988) propose that satisfaction is rooted in the disparity between customer expectations and actual experiences, emphasizing the role of perceived service quality. Similarly, Kotler (2009, p. 789) refers customer satisfacion as "a person's feelings of pleasure or disappointment that results from comparing a product's perceived performance or outcome with his/her expectations". This perspective suggests that satisfaction is achieved when experiences meet or surpass expectations, while falling short leads to dissatisfaction. Expanding on this, Keller (2006) characterizes customer satisfaction as an emotional response, comparing product perception to initial expectations. This definition underscores the subjective nature of satisfaction, framing it as a personal feeling state rather than a purely rational evaluation. Keller posits that customers develop expectations based on prior experiences, marketing messages, and individual needs, with satisfaction emerging when products align with or exceed these preconceived notions. Griffiths et al. (2007) further elucidate the complexity of user satisfaction by highlighting its lack of an objective definition. They argue that satisfaction, being inherently subjective, varies widely among individuals due to personal perceptions, expectations, and unique experiences with products or services. This variability presents significant challenges in establishing consistent measurement criteria across diverse user groups. Sá (2008) contributes to this discourse by proposing a dual-framework approach to understanding user satisfaction: outcome-oriented and process-oriented. The outcome-oriented approach views satisfaction as a result emerging after product or service consumption, focusing on whether expected benefits were delivered. In contrast, the process-oriented approach defines satisfaction as the gap between predicted and accomplished satisfaction, emphasizing the dynamic nature of user experience. In this study, we employ the outcome-oriented approach to define and measure user satisfaction in the context of PFMAs.

2.2. The customer perceived value model

Customer value refers to a "trade-off between multiple benefits and sacrifices" (Walter et al., 2001, p. 366), and "perceived benefits/perceived price" (Liljander & Strandvik, 1993, p. 14). While earlier research emphasized customer value as the relationship between price and quality (Yoo & Park, 2016), recent studies highlight that perceived value might be personal and situational, varying among customers based on their preferences and experiences (Holbrook, 1999). This implies that values perceived by customers when using the same products or services can differ.

The Customer Perceived Value (CPV) model, developed by Zeithaml (1988), evaluates user satisfaction based on the trade-off between perceived benefits and costs associated with product usage. Zeithaml defines perceived value as a consumer's overall assessment of a product's utility, considering both benefits received (functional, emotional, and social) and costs incurred (monetary, time, effort, and psychological). This assessment is subjective and comparative, varying between individuals and alternatives. Consumers make value judgments by weighing these benefits against costs, with higher perceived value resulting from high benefits at lower perceived costs (Saif et al., 2024). Recent studies have further validated and expanded this model. Elan (2023) found that perceived ease of use and enjoyment significantly affect user satisfaction in food delivery apps. focused on evaluating perceived value through benefits received versus sacrifices made, while Hong et al. (2023) demonstrated that

functional, price, and emotional value significantly improve customer satisfaction in food delivery robot services. In applying this theory to research frameworks, elements of benefits and sacrifices are often selected based on models like that of Blut et al. (2023), as this approach includes factors that directly impact user perception or influence it through perceived value, leading to overall satisfaction or dissatisfaction.

Kumar et al. (2023) found that customer experiences in various aspects of grocey mobile apps, including ordering, delivery, payment, app search, customer support via chat and mobile, stock availability and product quality, have effects on customer satisfaction.

2.3. Hypothesis formulation and conceptual framework

2.3.1. User convenience and user satisfaction

User convenience refers to the ease and efficiency with which users can perform tasks within a system, focusing on reducing time and effort (Benoit et al., 2017). By using the app, users can improve their time management and increase their effectiveness in managing their finances. Time convenience significantly influences user satisfaction in mobile banking and financial management applications. Positive user responses are strongly associated with the convenience of mobile banking apps. Users are more likely to express satisfaction when the application allows for quicker and easier transactions, highlighting the direct link between time efficiency and user satisfaction (Jahan & Shahria, 2022; Oh & Kim, 2022; Susanto et al., 2023). Pratomo et al. (2023), who applied the End User Computing Satisfaction (EUCS) model to assess user satisfaction in the context of the MyPertamina app, underscores that ease of use and the ability to perform transactions quickly positively impact user satisfaction. Thus, the evidence from these studies supports the following hypothesis:

H1: User convenience positively affects user satisfaction of PFMAs

2.3.2. User control and user satisfaction

User control, which encompasses the ability to personalize and manage interactions with PFMAs, is a significant factor influencing user satisfaction (Mainardes et al., 2023). When users can tailor their interactions and manage app settings, their satisfaction with the application improves significantly. For example, user-centered design, which includes providing users with control over their application experience such as adjust settings and manage transactions according to their preferences (Kamboj et al., 2022; Rahardja et al., 2023), is crucial for enhancing satisfaction (Frans et al., 2024; Pratomo et al., 2023). Thus, the following hypothesis is proposed:

H2: User control positively affects user satisfaction of PFMAs

2.3.3. User effort and user satisfaction

User effort, such as dealing with complex procedures or multi-step applications, can lead to decreased user satisfaction (Kamboj et al., 2022). When users are required to engage in laborious or non-intuitive interactions, their enjoyment and satisfaction with the app are negatively affected (Yin et al., 2022). Complex and cumbersome application features can lead to dissatisfaction and reluctance to use the app (Oh & Kim, 2022; Saprikis et al., 2022). For instance, the gamification element of health and fitness apps, if poorly implemented, can increase the perceived effort required by users, thereby reducing their satisfaction (Yin et al., 2022). Therefore, it is assumed that:

H3: User effort negatively affects user satisfaction of PFMAs

2.3.4 Perceived risk and user satisfaction

Perceived risk refers to users' subjective judgment about the likelihood of negative occurrences that violate their privacy and security when using mobile apps (Chopdar et al., 2018; Mainardes et al., 2023). One of the main barriers for user to positively engage with with financial technology lies in their concerns about the safety of their financial transactions and personal information. Users' fears of financial loss or misuse of their data directly affect their overall satisfaction, illustrating that perceived risk is a paramount factor in users' evaluation of financial applications. Increased perceived risk related to the privacy, security and reliability of the systems leads to lower satisfaction and a decreased likelihood of continued usage (Belanche et al., 2022; Jangir et al., 2022). In the context of fintech aaps, perceived risk, particularly related to financial fraud and data breaches, significantly reduces user satisfaction. When users view an application as risky, their trust in the app diminishes, leading to a lower overall satisfaction level. This is because users' apprehensions about potential threats negatively influence their perception of the application's reliability and their overall experience (Almaiah et al., 2023). Therefore, it is assumed that:

H4: Perceived risk negatively affects user satisfaction of PFMAs

2.3.5. User convenience and perceived value

Perceived value can be understood as the overall evaluation of what users receive from a product or service relative to what they pay for it. It encompasses various dimensions such as functional, economic, and emotional benefits (Zeithaml, 1988). The prior studies suggest that user convivence is a vital factor to enhance users' perceived value, highlighting the importance of minimizing features-related inconveniences in improving user satisfaction (Chakraborty et al., 2022; Ofori et al., 2022; Saif et al., 2024). Empirically, Dastane et al. (2023) developed a scale to measure perceived value in mobile commerce and affirmed that user convenience is a significant driver of perceived value across various mobile applications. As a result, the relationship between user convenience and perceived value can be stated as follows:

H5: User convenience is positively associated with perceived value of PFMAs

2.3.6. Control and perceived value

User control refers to the extent to which users can customize and manage their interactions with a (PFMA) according to their preferences. Personalize interactions significantly improves users' evaluations of the app's worth. Apps offering extensive user control are more valued by users due to increased flexibility and customization, supporting the notion that greater user control leads to increased perceived value (Saif et al., 2024). Thus, the hypothesis is as follows:

H6: User control positively affects perceived value of PFMAs

2.3.7. Effort and perceived value

Research consistently supports that increased user effort negatively impacts the perceived value of PFMA. Rahardja et al. (2023) examined how users' emotions and continuance intention are influenced by design and performance attributes of mobile payment application. Their research found that applications perceived as difficult to use or requiring significant effort directly affects the

perceived value by influencing user experience and emotional responses. The user tends to negatively respond to additional effort associated with security measures, such as facial recognition, or financial transaction processing (Chatterjee et al., 2023; Hu et al., 2023; Yang et al., 2023). Thus, the proposed hypothesis is as follows:

H7: User effort negatively affects perceived value of PFMAs

2.3.8. Risks and perceived value

When using the app, users face various risks such as privacy risk, security risk or reliability risks. Higher risks are associated with lower trust and willing to adopt the app since most users concerns about potential financial fraud and security breaches (Almaiah et al., 2023). Their perceptions about these risks drive their notion on how they value the app: if an individual perceive higher risk for an apps, they tend to perceived the app as lower value and vice versus (Jain & Raman, 2023). Therefore, the hypothesis is as follows:

H8: Perceived risk negatively affects perceived value of PFMAs

2.3.9. Perceived value and user satisfation

Research consistently demonstrates that higher perceived value enhances user satisfaction. Bergmann et al. (2023) confirmed through a meta-analysis that perceived value is a significant predictor of user satisfaction and continued use of financial technology applications. For instance, Azzahra and Kusumawati (2023) found that perceived value significantly impacts user satisfaction and continuance intention toward the MyTelkomsel app. Similarly, Zhong and Chen (2023) emphasized that perceived value, alongside perceived risk, is a main antecedent of user satisfaction and loyalty in mobile payment systems. This aligns with findings from Al Amin et al. (2024), who noted that perceived value positively influences e-satisfaction and continued usage of mobile payment applications in the context of the COVID-19 pandemic. Therefore, it is assumed that:

H9: Perceived value positively affects user satisfaction of PFMA

2.3.10. Research framework

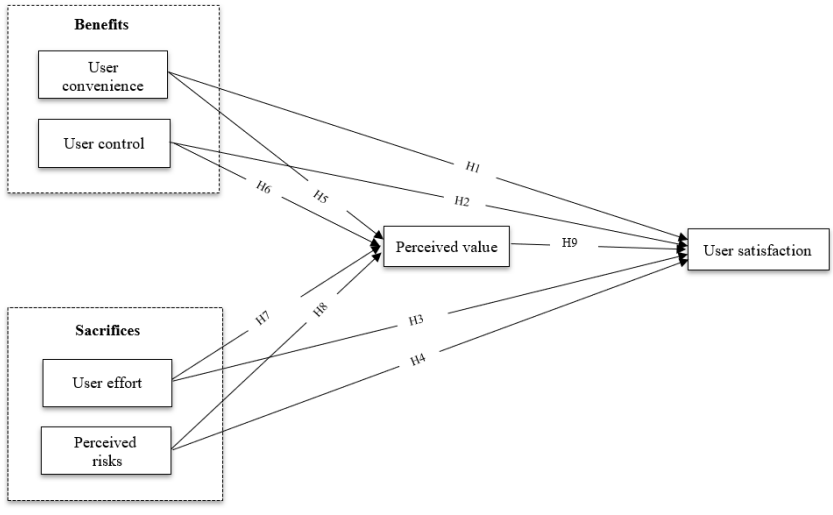

Figure 1. The research framework

3. METHODOLOGY

3.1. Measurement

To evaluate the factors affecting user satisfaction of personal financial management applications (PFMAs) in Vietnam, this study employed a multi-item scale approach. Each construct was assessed using a series of questions, with individual items rated on a seven-point Likert scale. The measurement scales were adapted from prior studies: user convenience from Mathwick et al. (2001); user control from Katherine and Cassie (2024) and Mathwick et al. (2001); user effort from Dabholkar and Bagozzi (2002) and Kleijnen et al. (2007); perceived risks from C.-H. Lin et al. (2005) and Stone and Grønhaug (1993); and perceived value and user satisfaction from C.-H. Lin et al. (2005). Higher scores indicate higher levels of user convenience, user control, user effort, perceived value, and user satisfaction. However, a higher of perceived risk indicates a lower level of perceived risk.

Table 1 presents measures of all constructs, providing transparency and replicability for future research.

Table 1. Measurement constructs

Variables	Items	Code	References
User convenience (CON)	Using PFMAs to manage finance is an efficient way to manage my time.	CON1	Mathwick et al., 2001
	Using PFMAs to manage finance makes my life easier.	CON2	
	Manage personal finances with PFMAs fits with my schedule.	CON3	
	I find spend money to use PFMAs would be a better way to spend my money.	CON4	
Control (COTRO)	I have flexibility when using PFMAs.	COTRO 1	Kleijnen et al., 2007; Mathwick & Rigdon, 2004
	I have control over my information when using PFMAs.	COTRO 2	
	Using PFMAs on my personal device allows me to make many of my own decisions.	COTRO3	
Effort (EFOR)	It is uncomplicated to use PFMAs.	EFOR 1	Dabholkar & Bagozzi, 2002; Kleijnen et al., 2007
	Understanding how to use PFMAs requires me little effort.	EFOR 2	
	I found it very easy to learn how PFMAs work.	EFOR 3	
Risks (RISK)	I feel my privacy is protected even when using PFMAs.	RISK1	C. H. Lin et al., 2005; Stone & Grønhaug, 1993
	I feel safe using the app on multiple devices at once	RISK2	
	PFMAs have adequate security features	RISK3	
	I don't wonder about the actual reliability of PFMAs when I have to spend money to use the application.	RISK4	
Perceived Value (VALUE)	Compared with the price I paid, PFMAs offer good features.	VALUE 1	C. H. Lin et al., 2005
	Compared with the tangible and intangible costs I pay, the features and information I get from PFMAs in return are very valuable.	VALUE 2	
	I think I am getting good value for the money I spent.	VALUE 3	
User Satisfaction (SATIS)	I am satisfied with my decision to use PFMAs to manage finance.	SATIS 1	C.-H. Lin et al., 2005
	My choice to use PFMAs to manage finance was a wise one.	SATIS 2	
	I think I did the right thing to use PFMAs to manage finance.	SATIS 3	

3.2. Questionnaire design and pilot

This study utilized a structured self-administered questionnaire to investigate factors influencing user satisfaction of Personal Financial Management Applications (PFMAs) in Vietnam. The instrument was developed using a rigorous back-translation process (Usunier, 1998) to ensure linguistic and conceptual equivalence. The questionnaire underwent initial translation from English to Vietnamese, followed by reverse translation by an independent academic expert. A comparative analysis of both English versions enabled refinement of the Vietnamese translation (Harkness et al., 2010). A pilot study with representative participants facilitated the identification and correction of linguistic and typographical issues. This approach, incorporating feedback from potential respondents, aligns with best practices in survey design (Blair, 2013; Norman M. Bradburn, 2004; Van der Stede, 2006). This meticulous methodology aimed to minimize measurement error, enhance data quality, and ensure cultural appropriateness and conceptual validity within the Vietnamese context, thereby strengthening the reliability and validity of the study's findings on PFMA user satisfaction in Vietnam.

3.3. Sample and data collection

This study focused on young adults, primarily students and working professionals, due to their technological receptivity and varied financial resources. Convenience sampling was employed through an online survey using Google Forms, distributed via Facebook Messenger and Groups. The study's objectives and respondent anonymity were clearly communicated. From 235 initial surveys distributed over one week, 224 usable responses were obtained after screening for PFMA usage experience.

4. RESULTS AND DISCUSSION

4.1. Data analysis with PLS-SEM using Smart-PLS

Examination of data characteristics was conducted through descriptive statistics, followed by measurement model and structural model analyses using SmartPLS 4.0. The measurement model assesses unidirectional relationships between items of a single construct, focusing on construct reliability and validity. Items with outer loadings greater than 0.7 are retained; Cronbach's Alpha (CA $\geq$ 0.7) and composite reliability (CR > 0.708) indicate internal consistency of all items measuring a construct. Convergent validity is established with Average Variance Extracted (AVE) > 0.5, while discriminant validity is confirmed when a construct's AVE square root exceeds its highest correlation with other constructs. Structural model evaluation tests the study's hypotheses by assessing the relationships between exogenous and endogenous variables using t-statistics, with values exceeding 1.96 indicating significance at the 0.05 level. The coefficient of determination (R^2) is also examined. Additional metrics often include effect sizes (f^2) and model fit (SRMR) to provide a comprehensive assessment of the model's explanatory and predictive capabilities (Hair et al., 2022).

4.2. Research findings

4.2.1. Respondent's characteristic

This study of 224 participants revealed that PFMA users in Vietnam are predominantly workers (73.2%) and female (74.6%). The age distribution showed a strong skew towards younger users, with 72.32% aged 18-25 and 25% aged 26-35. This demographic profile suggests that PFMAs are particularly popular among students, recent graduates, and early-career professionals. The inclusion of non-working students indicates PFMAs' potential benefits for budgeting and expense management in

this group. The adoption across various age groups, including those with stable incomes, suggests a broader trend of digital financial management tool usage. These findings have important implications for PFMA developers and marketers in tailoring their products and strategies to meet the needs of diverse user groups, with a particular focus on the preferences of younger, digitally-savvy users who form the majority of the current user base in Vietnam.

4.2.2 An evaluation of measurement model

Figure 2 presents a comprehensive measurement model for evaluating user satisfaction with Personal Financial Management Apps, incorporating six main constructs: Convenience (CON), Control (COTRO), Effort (EFOR), Risk (RISK), Perceived Value (VALUE), and Satisfaction (SATIS). Each construct is measured by multiple indicators, with outer loadings consistently above 0.7, indicating strong indicator reliability and good internal consistency.

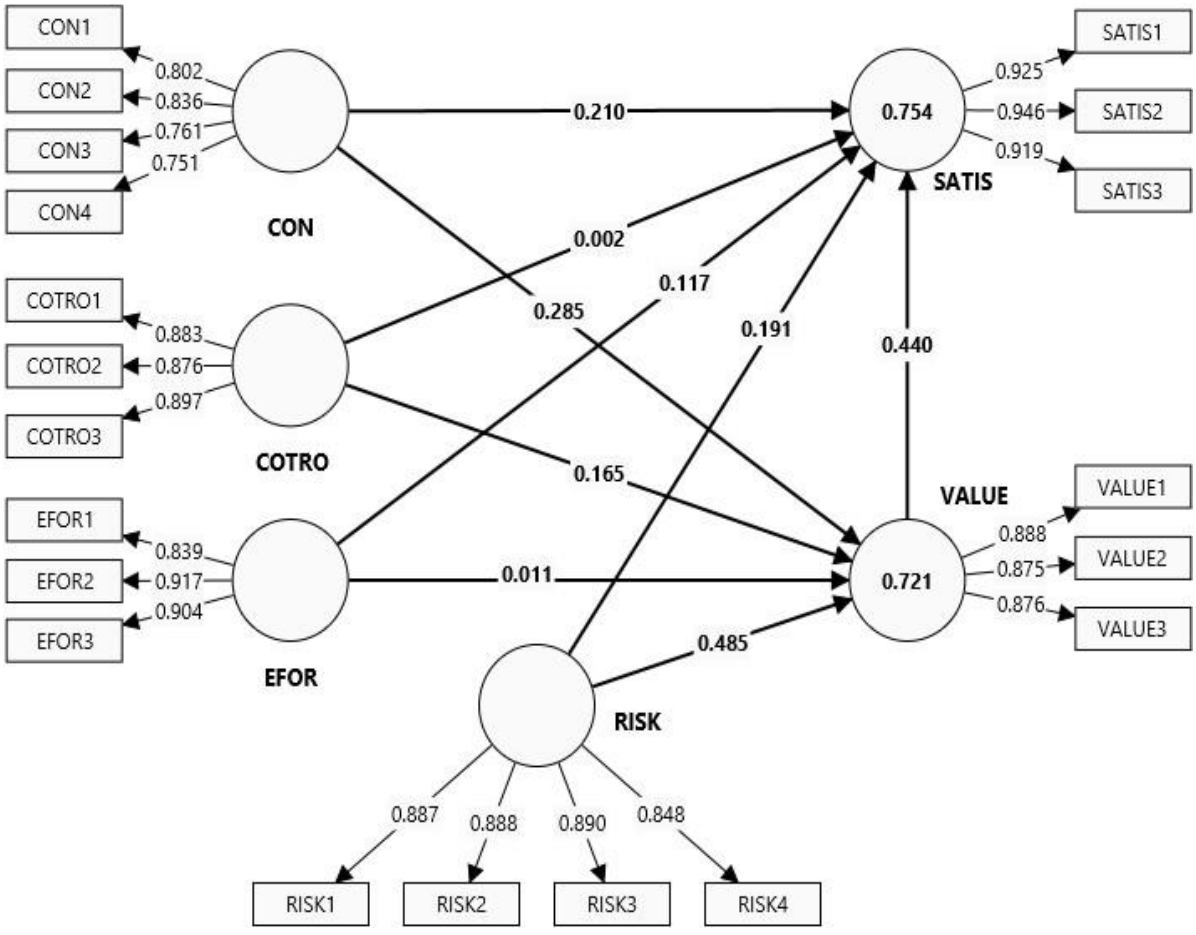

Figure 2. The measurement model

The first step in assessing construct reliability is analyzing indicator (outer) loadings. Higher values indicate stronger item-factor correlations. All items of each construct in this study meet the criterion of indicator loadings above 0.7 (p-values < 0.001) (Hair et al., 2022), indicating likely real latent constructs. Table 2 presents the means, standard deviations, and outer loadings for all constructs' items.

Table 2. Means, standard deviations, and outer loadings of constructs' items

Items	Means	Standard deviations	Outer loadings	P-values
CON1 <- CON	5.580	0.763	0.802	0.000
CON2 <- CON	5.531	0.850	0.836	0.000
CON3 <- CON	5.571	0.799	0.761	0.000
CON4 <- CON	5.371	0.969	0.751	0.000
COTRO1 <- COTRO	5.638	0.737	0.883	0.000
COTRO2 <- COTRO	5.540	0.737	0.876	0.000
COTRO3 <- COTRO	5.585	0.727	0.897	0.000
EFOR1 <- EFOR	5.518	0.845	0.839	0.000
EFOR2 <- EFOR	5.531	0.755	0.917	0.000
EFOR3 <- EFOR	5.545	0.772	0.904	0.000
RISK1 <- RISK	5.371	0.936	0.887	0.000
RISK2 <- RISK	5.375	0.941	0.888	0.000
RISK3 <- RISK	5.371	0.897	0.890	0.000
RISK4 <- RISK	5.326	1.063	0.848	0.000
SATIS1 <- SATIS	5.513	0.871	0.925	0.000
SATIS2 <- SATIS	5.487	0.886	0.946	0.000
SATIS3 <- SATIS	5.527	0.906	0.919	0.000
VALUE1 <- VALUE	5.388	0.788	0.888	0.000
VALUE2 <- VALUE	5.379	0.842	0.875	0.000
VALUE3 <- VALUE	5.455	0.828	0.876	0.000

Table 3 shows Cronbach's alpha values greater than 0.7 and composite reliability greater than 0.708, indicating internal consistency of items within constructs. AVE values greater than 0.5 for all constructs demonstrate convergent validity, confirming that items share significant variance due to underlying constructs rather than measurement error (Hair et al., 2022).

Table 3. Construct reliability

Constructs	Cronbach's alpha	Conposit reliability (rho_a)	Average variance extract (AVE)
CON	0.797	0.802	0.621
COTRO	0.862	0.862	0.784
EFOR	0.864	0.866	0.787
RISK	0.901	0.902	0.772
SATIS	0.922	0.922	0.865
VALUE	0.854	0.854	0.774

The discriminant validity of the constructs is confirmed through the analysis presented in Table 4, which employs the Fornell-Larcker criterion. This criterion stipulates that the square root of the Average Variance Extracted (AVE) for each construct should exceed its correlation with any other

construct in the model. The diagonal elements (in bold) represent these square root AVE values, while off-diagonal elements show the correlations between constructs. All constructs in the study demonstrate satisfactory discriminant validity, as evidenced by their diagonal values being larger than any off-diagonal element in the same row and column.

Table 4. Discriminant validity

	CON	**COTRO**	**EFOR**	**RISK**	**SATIS**	**VALUE**
CON	**0.788**					
COTRO	0.665	**0.885**				
EFOR	0.694	0.686	**0.887**			
RISK	0.758	0.568	0.627	**0.879**		
SATIS	0.776	0.611	0.659	0.777	**0.930**	
VALUE	0.770	0.638	0.626	0.802	0.829	**0.880**

4.2.3. Structural model assessment for hypothesis testing

Before testing hypotheses, multicollinearity is identified. Table 5 show that The variance inflation factors (VIFs) of the independent variables were lower than 5, indicating that an issue of multicollinearity between exogenous variables is not present in the model (Hair et al., 2014).

Table 5. The variance inflation factors (VIFs) of exogenous variables

	VIF
CON -> SATIS	2.188
CON -> VALUE	2.126
COTRO -> SATIS	2.369
COTRO -> VALUE	2.258
EFOR -> SATIS	2.389
EFOR -> VALUE	2.388
RISK -> SATIS	4.273
RISK -> VALUE	2.184
VALUE -> SATIS	4.287

Figure 3 presents a comprehensive structural equation model (SEM) illustrating the relationships between various constructs in the study of user satisfaction with Personal Financial Management Apps. The model incorporates six main constructs: convenience (CON), control (COTRO), effort (EFOR), risk (RISK), perceived value (VALUE), and satisfaction (SATIS), each measured by multiple indicators. The arrows between constructs represent hypothesized relationships, with p-values indicating their statistical significance. The model's explanatory power is robust, with R^2

values of 0.721 for Perceived value and 0.754 for satisfaction, indicating that it accounts for 72.1% and 75.4% of their variances, respectively. All indicators demonstrate significant loadings on their constructs (p=0.000), supporting good measurement validity. The model suggests that perceived value mediates the relationships between some predictors (convenience, control, risk) and satisfaction. Overall, this structural model provides a nuanced view of the factors influencing user satisfaction with Personal Financial Management Apps, highlighting both direct and indirect effects and offering valuable insights for understanding user experience in this domain.

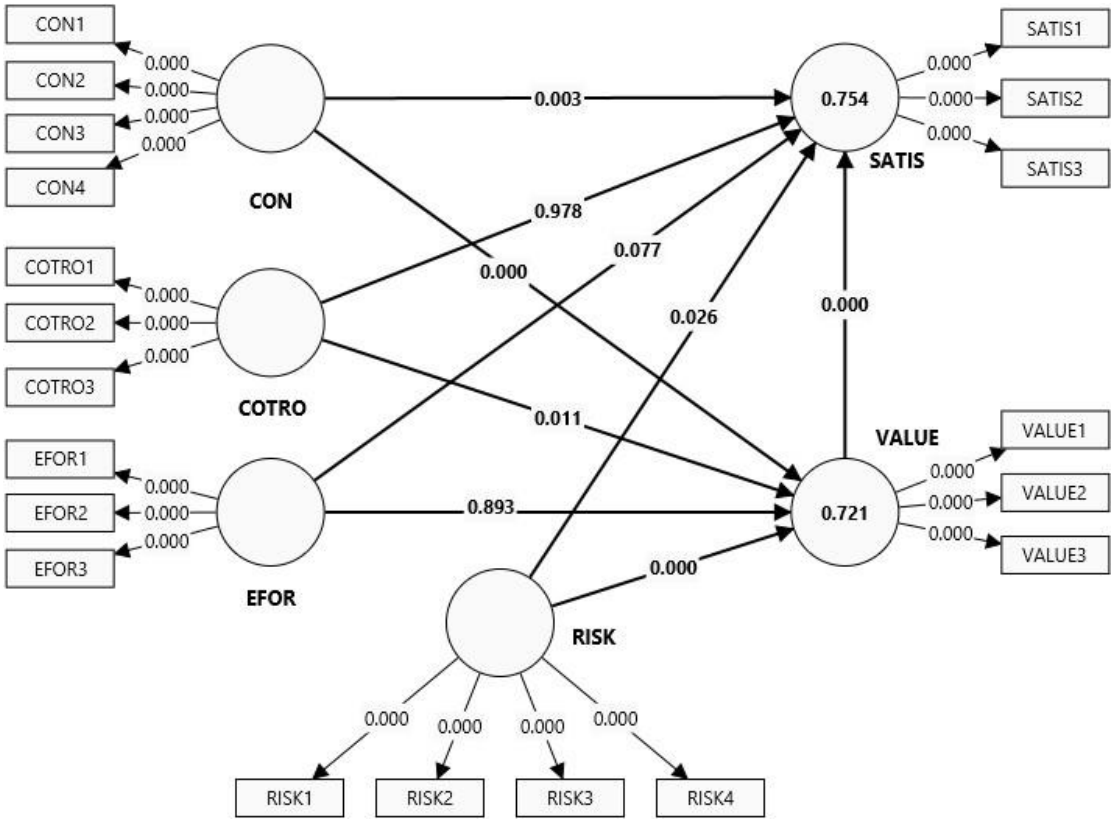

Figure 3. The structural model

The results of data analysis for testing hypothesis presented in Table 6.

Table 6. Results of hypothesis testing

Hypothesis	ß	Adjusted R^2	P-values	f-square	Conclusion
H1: CON -> SATIS	0.210	0.748	0.003**	0.052	Accepted
H2: COTRO -> SATIS	0.002		0.978	0.000	Rejected
H3: EFOR -> SATIS	0.117		0.077*	0.023	Rejected
H4: RISK -> SATIS	0.191		0.026**	0.045	Accepted
H9: VALUE -> SATIS	0.440		0.000***	0.219	Accepted
H5: CON -> VALUE	0.285	0.716	0.000***	0.093	Accepted
H6: COTRO -> VALUE	0.165		0.011**	0.045	Accepted

Hypothesis	ß	Adjusted R^2	P-values	f-square	Conclusion
H7: EFOR -> VALUE	0.011		0.893	0.000	Rejected
H8: RISK -> VALUE	0.485		0.000**	0.341	Accepted

*Two-tailed tests of all hypotheses: * p < 0.1; ** p < 0.5; *** p < 0.01*

Table 6 presents the results of data analysis regarding relationships between factors influencing user satisfaction. The model demonstrates strong explanatory power, with adjusted R^2 values of 0.748 for Satisfaction and 0.716 for Perceived Value. Of the nine hypotheses tested, six were accepted and three rejected. The analysis confirms hypotheses H1 and H4, indicating that app convenience ($\beta = 0.210$, $p < 0.05$) and perceived risks ($\beta = 0.191$, $p < 0.05$) positively correlated with user satisfaction, respectively. For indirect effects, the data analysis confirmed that app convenience ($\beta = 0.285$, $p < 0.01$), user control ($\beta = 0.165$, $p < 0.05$), and perceived risks ($\beta = 0.485$, $p = 0.01$) positively impact perceived value, supporting hypotheses H5, H6, and H8 respectively. Furthermore, perceived value has a significant positive effect on user satisfaction ($\beta = 0.440$, $p < 0.01$). These findings demonstrate both direct and indirect effects on user satisfaction, highlighting the complex interplay of factors in shaping user experiences with Personal Financial Management Applications.

Table 6 shows relatively large effect sizes (f^2) for hypotheses 8 and 9 (Risk → Value and Value → Satis) at 0.341 and 0.219 respectively, indicating strength between perceived risk and perceived value as well as perceived value and user satisfaction. The value of f-square is zero for the relationship between user effort and perceived value, and between user control and satisfaction. The remaining relationships have small effect sizes ($f^2 < 0.1$). Model fit, assessed via SRMR, shows acceptable values (0.065 for both saturated and estimated models).

5. CONCLUSION

5.1. Discussion and conclusion

The results indicate that when the PFMA apps create user convenience in terms of time management and personal financial management, they lead to user satisfaction, as demonstrated in prior studies (e.g. Jahan & Shahria, 2022; Oh & Kim, 2022; Susanto et al., 2023). However, this satisfaction reduces if users perceive high risks from using the app, as concluded by other researchers (e.g. Belanche et al., 2022; Jangir et al., 2022). User convenience increases, whereas risks decrease, the value perceived by users, which aligns with Blut et al. (2023). User control does not have a direct effect on user satisfaction, which contradicts findings of prior studies indicating that user control significantly contributes to user satisfaction (e.g. Kamboj et al., 2022; Rahardja et al., 2023). Instead, this relationship is mediated by perceived value. An explanation for this contradiction might lie in users' need for ready-to-use settings rather than customized time-consuming settings: users have to compromise between their flexibility and time spent on setting their preferences. Thus, user control is valued by users if this function brings them more benefits compared with the amount of time they spend controlling the apps. Users' perception of value increases when they have greater control over the service process, leading to enhanced satisfaction. This can be attributed to a sense of empowerment and reduced anxiety and uncertainty(Auh et al., 2007; Jean-Charles Chebat, 2000). Perceived value emerges as a significant determinant of user satisfaction, corroborating the findings of Blut et al. (2023) and Zeithaml (1988).

The results indicate a direct positive correlation between user effort and satisfaction, consistent with previous research (e.g. Oh & Kim, 2022; Saprikis et al., 2022). However, this relationship is not mediated by perceived value. This phenomenon may be explained by the moderating effects of product/service type and usage context on the effort-value relationship. In scenarios involving high-engagement products or services where users anticipate expending more effort, increased effort does not necessarily diminish perceived value (Homburg et al., 2005).Wathieu & Bertini (2007) posit that effort can augment perceived value when it engenders a sense of achievement or when consumers believe their efforts yield superior outcome. In the context of PFMAs, the data suggests that survey respondents prioritize convenience factors. Consequently, they may not perceive the effort expended in using PFMAs as burdensome, or effort-related issues may not significantly impact their perception of the application's value. This interpretation aligns with the notion that the effort-value relationship is contingent upon the specific characteristics of the product or service and the user's expectations.

5.2. Contribution and implications of the study

This study contributes to the extant literature on user satisfaction by empirically examining the impact of diverse factors on user satisfaction with Personal Financial Management Applications (PFMAs), thereby validating the Customer Perceived Value (CPV) model in the novel context of PFMAs in Vietnam. The findings have both theoretical and practical implications. From a theoretical perspective, this research extends the application of the CPV model to a previously unexplored domain, offering insights into the factors influencing user satisfaction in the emerging field of personal financial technology. The study's results corroborate the model's applicability in this new context, while also revealing nuanced relationships between variables that may be specific to PFMAs or the Vietnamese market.

This study not only advances our theoretical understanding of user satisfaction in the context of PFMAs but also provides actionable insights for practitioners in the financial technology sector. The research findings provide valuable guidance for PFMA developers and businesses. The results underscore the importance of optimizing user convenience and ease of use, as these factors demonstrate a direct positive impact on user satisfaction. Moreover, the study highlights the critical role of risk mitigation in enhancing the customer experience. Application developers should prioritize the implementation of robust security measures and transparent risk management protocols to address user concerns and bolster trust. Furthermore, the research emphasizes the dual role of customer perceived value as both a mediating factor and a direct determinant of user satisfaction. This finding suggests that businesses should adopt a holistic approach to value creation, considering not only the functional benefits of their applications but also the broader value proposition perceived by users. To enhance perceived value, organizations should implement systematic mechanisms for gathering and incorporating user feedback, and continually reassess their value offerings in light of evolving user needs and market conditions.

5.3. Limitation and future research

Despite significant efforts to enhance the validity and reliability of the research findings, this study has several limitations. The reliance on self-reported data rather than observational methods potentially introduces response bias. While the sample size meets the requirements for the regression model, the uneven distribution of participants across age, occupation, and gender demographics might bias the findings. The study factors did not exhibit significant positive correlations with one another,

and it is important to note that positive correlations do not imply causal relationships between variables. Future research could further explore the generalizability of these findings across different cultural contexts and investigate potential moderating factors that may influence the relationships observed in this study.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contribution of anonymous respondents to the completion of this study.

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