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Mobile Banking Adoption of Low-income Customer: A Combination between Theory of Planned Behavior and Technology Acceptance Model

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Abstract. Millions have been spent developing mobile banking systems, yet indications indicate prospective users may not be taking these advantages. Based on the combination of the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM), this study aimed to explore key factors that impacted the mobile banking adoption of low-income customers. Data from 690 consumers in Vietnam were collected to analyze the combination of TAM and TPB. The findings prove the combination of TAM and TPB in forecasting consumers' intentions to use mobile banking. Several managerial implications for businesses on the user acceptability of mobile banking are highlighted.

Keywords: Mobile banking, low-income customer, Theory of Planned Behavior, Technology Acceptance Model

1. Introduction

While financial institutions push mobile banking (m-banking) on their clients, its widespread uptake remains limited (Alonso-Dos-Santos *et al.*, 2020). Despite the rise of m-banking in Vietnam, due in part to the public's fear of the COVID-19 virus, most customers still use ATMs to withdraw cash (Naeem *et al.*, 2022). Individuals are less interested in m-banking in underdeveloped nations, so it has not reached its full potential (Farah *et al.*, 2018; Khoa, 2023). Customers in Vietnam are also not very interested in using m-banking services; hence, banks must learn what motivates customers to use m-banking to expand their user bases. Banks can increase m-banking by capitalizing on their existing customer relationships (Arcand *et al.*, 2017).

There is widespread support for using technological innovations like m-banking to improve access and reduce the cost of financial services. The recent coronavirus pandemic illness in 2019 (COVID-19) has further shown the need for m-banking solutions, which allow customers to conduct financial transactions from any location at any time (Naeem *et al.*, 2022). Managers are always on the lookout for new ways to improve their services, and m-banking has the potential to be useful for both financial institutions and their customers (Alonso-Dos-Santos *et al.*, 2020) due to the lower transaction costs and the ease of access to financial services that it provides (Watat & Madina, 2020). M-banking has been shown to enhance financial inclusion, which in turn helps a nation develop and prosper. Despite the growing prevalence of Internet-connected mobile phones, many low-income customers in developing nations are still uninterested in m-banking services (Alalwan *et al.*, 2016). Eighty percent of the world's population lives in developing economies, where there is a great opportunity for international commerce and where 6.4 billion wireless connections cover 85 percent of the population of seven billion people (Miniwatts Marketing Group, 2021). Moreover, businesses lack insight into how widely low-income customers have adopted m-banking and how that adoption varies across cultural contexts. It is, therefore, crucial to understand what influences low-income customers in developing countries to use m-banking.

Put emerging markets are low-income developing nations with high rates of economic development. Due to their potential to boost the economy and solve problems caused by structural restrictions, mobile financial services were identified by Kaur *et al.* (2020) as a topic worthy of study in developing economies. Although the uptake of m-banking has been studied at length in advanced economies, little is known about its impact on low-income clients in developing regions. Research performed on middle- and high-income groups cannot apply to low-income groups due to considerable disparities in their views, attitudes, and purchasing behavior towards services and commodities (Purohit & Arora, 2021). Existing frameworks are insufficient to anticipate the behavior of low-income consumers due to these

disparities (Khoa, 2024; Purohit & Arora, 2021).

The widespread use of m-banking has been the subject of several studies, but there is little in the way of empirical data that captures the desire to use m-banking in the low-income customer context (Ajitha *et al.*, 2022; Rahi & Abd. Ghani, 2019). Hence, flexibility is essential in the financial services industry, specifically banking, to maintain competitiveness and relevance. In addition, cutting-edge banking innovations must accommodate today's customers by meeting their expectations regarding accessibility, usability, and the availability of relevant markets (Tabash, 2019).

While m-banking in Vietnam provides several benefits, few people use them. In the same vein, academic studies on Vietnamese low-income customer m-banking behavior are quite rare. So, this study aimed to examine the variables that affected the m-banking implementation of low-income customers based on the combination of the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM). From the result, the bank managers can have some managerial implications to enhance customer behavior in m-banking.

2. Literature review

2.1. Theoretical model

The Theory of Reasonable Action (TRA) is the foundation of both TPB and TAM, which postulates that one's beliefs affect one's attitudes, which generate intents that lead (Albarracin *et al.*, 2001). Sociological theory informs this picture of individual actions. The adoption and use of information technology are the subjects of various new ideas that have developed in recent years. Several theories exist to explain people's openness to new technologies, but each model emphasizes a distinct set of factors. Popular individual-level theoretical models that attempt to explain the connection between user beliefs, attitudes, and intentions include the Theory of Reasoned Action - TRA (Ajzen & Fishbein, 1975), the Theory of Planned Behavior - TPB (Ajzen, 1991; Yohanes Farley & Sfenrianto, 2021), and the Technology Acceptance Model - TAM (Davis, 1989). The objective of TAM is to foretell how widely adopted technologies will be in the workplace, where their success will depend on aspects including how helpful people find them and how simple they are to use. The TPB method analyzes how people feel they can influence their behaviors, such as how simple or complex it is to carry out a certain action.

The TAM has been used in several studies, such as by Luarn and Lin (2005), to evaluate the popularity and effectiveness of automated teller machines, m-banking, and Internet banking. Shah *et al.* (2011) utilized the TPB to measure consumers' Interest in m-banking services and found that consumers' willingness to adopt m-banking was affected by three factors: customers' perceptions of their

behavioral control, their attitudes about using m-banking services, and their perceptions of the norms of the industry. According to Kesharwani and Tripathy (2012), self-efficacy and risk perception substantially alter m-banking use through TAM modulation. Variables such as risk perception, relative benefit, and focus were also considered by Shareef *et al.* (2018). Also, the TAM enhancement discovered a favorable effect on customer intention to use m-banking services due to changes in perceived ease of use, perceived usefulness, perceived risk, and subjective norms (Khoa, 2020). Hence, this study proposed the theoretical model, as shown in Figure 1.

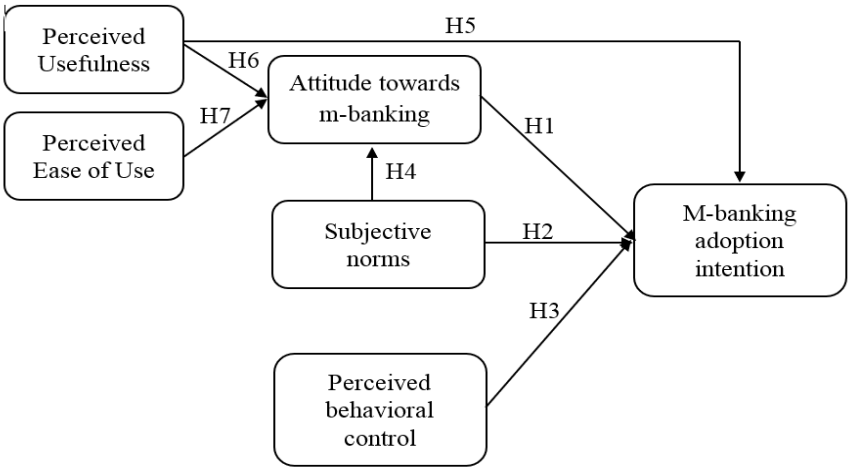

Figure 1. Theoretical model

2.2. Hypotheses development

Low-income customers often face unique challenges in accessing financial services and may have different perceptions and attitudes toward technology adoption than other groups. Based on the Theory of Planned Behavior, this research examines the link between attitudes toward mobile commerce, subjective norms, perceived behavioral control, and m-banking adoption intention among low-income clients (TPB). Specifically, a favorable attitude toward mobile commerce is expected to have a greater influence on the desire to embrace m-banking among low-income clients than among other categories (Aboelmaged & Gebba, 2013). It is also hypothesized that subjective norms will significantly impact m-banking adoption intention among low-income customers due to their reliance on social networks and ommunity ties. Furthermore, perceived behavioral control is expected to significantly impact m-banking adoption intention among low-income customers as they may face more significant technological barriers (Khasawneh & Irshaidat, 2017; Wang & Park, 2020). The proposed hypotheses aim

to provide insights into factors that may influence low-income customers' intention to adopt m-banking, which can help financial institutions design effective strategies to increase m-banking usage among this population. Hence, the hypotheses were proposed:

H1: Attitude towards m-banking positively impacts low-income customers' m-banking adoption intention.

H2: Subjective norms positively impact low-income customers' m-banking adoption intention.

H3: Perceived behavioral control positively impacts low-income customers' m-banking adoption intention.

A conviction that one must act in a certain way because of peer pressure (Ashraf, 2018). Family, friends, neighbors, and coworkers are all examples of influential people who might put social pressure on you. If others act in the same way increases the likelihood that people will conform to social norms. Conversely, if people are discouraged from engaging in a behavior because it is contrary to societal norms, that is to be expected (Memon *et al.*, 2020). So, people are more likely to participate in m-banking activities if they consider them to be admirable in themselves. In several empirical experiments, researchers found that people's subjective norms predicted their future attitudes. The research thus suggests:

H4: Subjective norms positively impact low-income customers' attitudes towards m-banking.

The Technology Acceptance Model (TAM) has been widely used to study users' acceptance of various technologies, including mobile commerce and m-banking (Memon *et al.*, 2020). Based on TAM, this study aims to develop hypotheses to investigate the relationship between perceived usefulness, perceived ease of use, attitude toward mobile commerce, and m-banking adoption intention among low-income customers. Specifically, perceived usefulness is hypothesized to influence m-banking adoption intention among low-income customers positively. Additionally, perceived ease of use is expected to significantly impact perceived usefulness and attitude toward mobile commerce among low-income customers, leading to a more positive m-banking adoption intention (Alonso-Dos-Santos *et al.*, 2020). It is also hypothesized that attitude toward mobile commerce will significantly impact m-banking adoption intention among low-income customers, given their potential skepticism towards technology and reliance on interpersonal communication (Watat & Madina, 2020). The proposed hypotheses aim to provide insights into factors that may influence low-income customers' intention to adopt m-banking, which can help financial institutions design effective strategies to increase m-banking usage among this population. Hence, this study proposed the hypotheses:

H5: Perceived usefulness in m-banking positively impacts low-income customers' m-banking adoption intention to adopt.

H6: Perceived usefulness positively impacts low-income customers' attitudes towards m-banking.

H7: Perceived ease of use positively impacts low-income customers' attitudes towards m-banking.

3. Research method

To test the hypotheses produced under the TPB and TAM modification model, this research used a quantitative questionnaire survey to collect information on the m-banking adoption intention of low-income consumers. PLS-SEM is more precise than covariance-based testing for nonparametric and new data; given the increasing complexity of current theories and the fact that PLS-SEM is superior for nonparametric and novel data (Henseler *et al.*, 2014), this study opted for partial least squares structural equation modeling (PLS-SEM) (Hair *et al.*, 2019). Moreover, SPSS version 26 was used for the statistical analysis, and a significant threshold of 0.05 was used. Furthermore, SmartPLS3 was used for PLS-SEM.

By analyzing the existing research and identifying qualities, a small group of m-banking professionals developed a list of items for accessing each construct's underlying dimensions, facilitating the final selection of components. Some elements were altered based on their input to make them more pertinent to the present context. Four questions measuring perceived ease of use (PEoU) and three items measuring perceived usefulness (PU) were adapted from the work of Aldammagh *et al.* (2021); Luarn and Lin (2005); Raza *et al.* (2017). Attitude towards m-banking (AT), Subjective norms (SN), Perceived behavioral control (PBC), and m-banking adoption intention (INT) have three items per construct, which were modified from the original study of Aldammagh *et al.* (2021); Lee (2009). All scales were graded by a 5-point Likert scale, with 1 grading strongly disagreeing and 5 representing strongly agreeing. Eight experts reviewed the revised questionnaire for face validity, and their feedback was utilized to adjust it before the questionnaire was deployed in a pilot test.

Using a standardized questionnaire, 690 individuals provided primary data. The survey's respondents were drawn randomly from a pool of low-income individuals with at least one bank account, and they were chosen to be representative of the four most important economic hubs in Vietnam (Ho Chi Minh City, Ha Noi, Can Tho, Da Nang). The sample selection criteria were the customers' familiarity with m-banking and their institution's support for m-banking. Utilization of direct questionnaire administration and human engagement with samples. The participants are older than 18 years old, and their vocations include housewife (22.6%), worker (25.4%), office worker (24.6%), and student (27.4%). The responder data are shown in Table 1.

Table 1. Respondent information

		Frequency	Percent
Gender	Male	413	59.9
	Female	277	40.1
Age	18 - 25	284	41.2
	26 -35	107	15.5
	36 - 45	213	30.9
	> 45	86	12.5
Occupation	Housewife	156	22.6
	Worker	175	25.4
	Office worker	170	24.6
	Student	189	27.4

4. Results

Fornell and Larcker (2018) stressed the importance of considering construct reliability (CA), Composite Reliability (CR), average variance extracted (AVE), and Outer loading (OL). The lowest value of CA in table 2 was 0.767, which is more than 0.7; hence, all scales are credible. According to Anderson and Gerbing (1988), convergent validity may be inferred from the measurement model by assessing the relevance of each indicator's estimated pattern coefficient on its supposed underlying component. The values of AVE and CR in table 2 are more than 0.5 and 0.70, respectively. In addition, the OL value of every item was more than 0.708%. Therefore, convergent validity was shown in this investigation.

Table 2. The reliability and convergent validity

Item	**OL**						**CA**	**CR**	**AVE**
	AT	*INT*	*PBC*	*PEoU*	*PU*	*SN*			
AT1	0.861						0.808	0.887	0.723
AT2	0.846								
AT3	0.842								
INT1		0.881					0.844	0.906	0.762
INT2		0.868							
INT3		0.870							
PBC1			0.908				0.842	0.903	0.757
PBC2			0.820						

Item	OL						CA	CR	AVE
	AT	*INT*	*PBC*	*PEoU*	*PU*	*SN*			
PBC3			0.880						
PEoU1				0.781			0.767	0.851	0.589
PEoU2				0.733					
PEoU3				0.826					
PEoU4				0.725					
PU1					0.827		0.774	0.869	0.689
PU2					0.829				
PU3					0.833				
SN1						0.836	0.801	0.883	0.715
SN2						0.857			
SN3						0.845			

The Fronell-Larcker criteria often determine whether a measurement model is discriminant. This criterion states that a construct's correlation with other constructs must be lower than the square root of the average variance retrieved by the construct. As Table 3, this requirement was met; therefore, discriminant validity has been demonstrated.

Table 3. Discriminant validity

	AT	**INT**	**PBC**	**PEoU**	**PU**	**SN**
AT	0.850					
INT	0.594	0.873				
PBC	0.369	0.417	0.870			
PEoU	0.510	0.491	0.407	0.767		
PU	0.419	0.454	0.317	0.378	0.830	
SN	0.545	0.567	0.516	0.624	0.567	0.846

Attitude towards m-banking and intention to adopt m-banking have R^2 of 0.36 and 0.461, respectively, indicating that up to 36% and 46.1% of variation may be explained by this endogenous latent component (Kontogiannis, 1999). Attitude towards m-banking had a medium effect on m-banking adoption intention (f^2 = 0.191); the rest of the effect size values were small (f^2 values from 0.02 to 0.07). Eventually, the model's prediction ability is satisfactory (Q^2_{AT} = 0.256 and Q^2_{INT} = 0.346), as shown in Table 4.

Table 4. f^2, VIF, R^2, and Q^2 value

	f^2		VIF		R^2	Q^2
	AT	*INT*	*AT*	*INT*		
AT		0.171		1.480	0.360	0.256
INT					0.461	0.346
PBC		0.020		1.384		
PEoU	0.070		1.641			
PU	0.025	0.023	1.475	1.507		
SN	0.063	0.047	2.071	2.039		

The path analysis-based structural model was calculated when a good fit was found with the measurement model. The results supported for our conceptual model are provided by Table 5, which shows that all significant correlations between latent components are in the expected direction. Table 5 pointed out that all hypotheses were supported with a 95% confidence level.

5. Discussion and Conclusion

Based on the data provided by the PLS-SEM method, Table 5 listed the beta, t-value, and p-value for each of the created hypotheses. According to the first hypothesis, attitude towards m-banking positively impacted m-banking adoption intention (beta = 0.369, t-value = 9.286). Moreover, subjective norms (beta = 0.227, t-value = 5.008) and perceived behavioral control (beta = 0.120, t = 3.142) positively influence the m-banking adoption intention. This result confirmed the Theory of Planned Behavior as indicating that attitude, subjective norms, and perceived behavioral control positively influence m-banking adoption intention in the context of low-income customers (Merhi *et al.*, 2019). In prior research, several studies have examined the factors influencing m-banking adoption among low-income customers (Aldammagh *et al.*, 2021; Lee, 2009). For example, a study by Kishore and Sequeira (2016) found that attitude and social influence were significant predictors of m-banking adoption among low-income customers in rural Karnataka.

Table 5. Hypotheses testing result.

Relationship	Beta	t-value	P Values	Hypothesis	Result
AT -> INT	0.369	9.286	0.000	H1	Supported
SN -> INT	0.227	5.008	0.000	H2	Supported
PBC -> INT	0.120	3.142	0.002	H3	Supported
SN -> AT	0.290	5.473	0.000	H4	Supported

Relationship	Beta	t-value	P Values	Hypothesis	Result
PU -> INT	0.136	4.048	0.000	H5	Supported
PU -> AT	0.151	3.881	0.000	H6	Supported
PEoU -> AT	0.272	6.511	0.000	H7	Supported

Following the result in Table 5, hypothesis H4 was accepted (beta = 0.29, t = 5.473). In the context of low-income customers, the impact of subjective norms on attitudes toward m-banking has been studied by various researchers, and the findings are consistent with the theory of planned behavior. Subjective norms, which refer to the perceived social pressure to adopt m-banking, can significantly predict attitudes towards m-banking among low-income customers. One study by Raza *et al.* (2019) found that subjective norms positively impacted attitudes toward m-banking. The study found that the perception of social pressure from family and friends to adopt m-banking services increased the positive attitude towards the service. Similarly, a study by Santini *et al.* (2020) found that social influence, including subjective norms, significantly positively impacted attitudes toward m-banking among low-income customers.

Lee (2009); Watat and Madina (2020) found that perceived usefulness and ease of use significantly predict attitudes toward m-banking adoption among low-income customers in African Economies. The result in Table 5 confirmed the TAM result, as perceived usefulness positively impacts attitude towards m-banking (beta = 0.151, t-value = 3.881) and M-banking adoption intention (beta = 0.136, t-value = 4.048); moreover, perceived ease of use also had the positive effect on attitude towards m-banking (beta = 0.272, t-value = 6.511). Hence, hypotheses H5, H6, and H7 were supported. In the context of low-income customers, the impact of perceived usefulness and perceived ease of use on attitudes towards m-banking and adoption intention has been studied by various researchers, and the findings are consistent with TAM. The TAM suggests that perceived usefulness and ease of use are important factors in determining the acceptance and adoption of new technology. One study by Negash (2011) examined the impact of perceived usefulness and ease of use on attitudes towards m-banking and adoption intention among low-income customers. The study found that perceived usefulness positively impacted attitudes towards m-banking and adoption intention among low-income customers. This result suggested that low-income customers are more likely to adopt m-banking if they perceive it as useful for their financial needs. Furthermore, the study found that perceived ease of use positively impacted attitudes toward m-banking. Low-income customers may have limited experience with technology and therefore perceive ease of use as an important factor in their adoption decision. This finding is consistent with prior research by Ammar and Ahmed (2016), who found that perceived ease of use significantly positively impacted adopting m-banking among low-income

customers.

Overall, the findings suggest that perceived usefulness and ease of use are important factors in promoting the adoption of m-banking among low-income customers. Financial institutions could design m-banking services that are user-friendly and provide clear and concise information about the benefits of the service to low-income customers. Additionally, financial education could help low-income customers understand how to use m-banking services effectively and how it can benefit their financial lives. In conclusion, perceived usefulness and ease of use are important factors in promoting the adoption of m-banking among low-income customers. Financial institutions could leverage these factors to design user-friendly m-banking services and provide financial education to low-income customers to promote their adoption of m-banking services.

Low-income customers' lack of access to traditional banking services and low financial literacy may pose additional barriers to m-banking adoption. Therefore, it may be necessary to provide additional support, such as financial education programs and simplified user interfaces, to address these barriers. While the specific factors influencing m-banking adoption may vary across different low-income customer contexts, the importance of attitude, subjective norms, and perceived behavioral control as significant predictors of adoption intention remains consistent with prior research. However, it is worth noting that additional contextual factors, such as financial literacy and trust in technology, may also be important to consider in low-income customer contexts. Therefore, understanding the unique contextual factors influencing m-banking adoption among low-income customers is crucial in developing effective strategies to promote adoption and improve financial inclusion.

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