

User Acceptance of Mobile Banking in Developing Country: A Path Analysis of Conceptual Model

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ABSTRACT

Mobile banking is one of the information systems that has been proliferating. Its use in Indonesia has increased yearly, with transactions exceeding 4 trillion in 2021. Bank Negara Indonesia, or BNI, is one of the banks that adopted mobile banking service. The increased use also reflects the challenges in continuity to receiving mobile banking services, such as security and privacy, risk, trust, and mobile usability. This research aims to find out how security and privacy, risk, trust, and mobile usability affect mobile banking acceptance by using the Technology Acceptance Model (TAM). This research was conducted by survey and using simple random sampling to determine the respondents. Descriptive and analytical data are evaluated using the SEM technique. The proposed hypothesis is supported if the p-value is less than or equal to 0.005. The result shows that the acceptance of mobile banking is affected significantly by security and privacy, perceived trust, and mobile usability, with p-values for each construct being 0.027, 0.000, and 0.015. At the same time, perceived risk has an insignificant effect on mobile banking acceptance, with p- a value of 0.094. The other finding is that perceived risk and perceived trust have significantly affected mobile banking acceptance with a p-value of 0.000. Security and privacy, risk, trust, and mobile usability are critical factors for mobile banking to be accepted by its users.

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1. Introduction

Nowadays, the banking industry has developed several information systems, one of which is mobile banking. Mobile banking is an information system that increases the value of banking business processes and improves banking services to customers [1]. With mobile banking, customers can access services 24 hours a day. Flexibility and ease of access to services, reducing customer queues, and reducing employee working time from each banking branch make mobile banking an excellent information system that must be designed, developed, implemented, and controlled to obtain optimization of information system implementation [2]. The advantages of mobile banking have encouraged the entire Indonesian banking industry to develop and implement this system in each of its respective industries.

The usage of mobile banking in Indonesia grows year after year. Moreover, the value of digital banking transactions reached 4,684 trillion around August 2021 [3]. According to information from OJK research results, transactions through Internet banking have also experienced a surge of 300% as of October 2021. Mobile banking has been adopted by many banks, including Bank Negara Indonesia (BNI). BNI is one of the best banking industries in Indonesia. It was recorded through the Top Brand Index score that in June 2022, BNI mobile had users of more than 10 percent of the index and served as the most popular mobile banking provider at number 4. It was recorded that the growth of BNI mobile

banking users alone had reached 11.8 million accounts as of May 2022, which has increased by 32 percent yearly [4].

Even though the use of BNI mobile banking has experienced growth in implementation, there are various challenges in sustaining banking services through BNI mobile banking. The main problem caused by an increase in mobile banking transactions is the threat of data theft by hackers [5]. The review page on BNI's Google Play Store mobile banking shows many criticisms related to problems when accessing BNI mobile banking. Some of the problems with BNI mobile banking experienced by users included error disturbances in BNI mobile banking, which caused many users to be uncomfortable and unable to make transactions; some users stated that there were errors per August among users, which caused problems for users. In addition, users also question the security of customer data. Problems with the security and availability of this information system may decrease the level of trust and acceptance among consumers in using BNI mobile banking to access services.

This phenomenon shows that the use of information systems in an organization stops with system development and requires the adoption of essential aspects that are factors in the success of information system implementation. One aspect that becomes a benchmark for the success of implementing an information system is that the system can be well received by its users on an ongoing basis. Security, privacy, risk, trust, and mobile usability must exist when implementing BNI mobile banking. The feeling of security over customer privacy data and the system's quality and availability will enlarge the user's confidence in using BNI mobile banking.

2. Methods

This research is designed to examine factors affecting user acceptance of the BNI mobile banking application. This comparative causal study aims to discuss the relationship between the examined constructs. This research uses the TAM research model, which has been tested by [6]. The research model is modified and adjusted to the research's needs, so it consists of five constructs: security and privacy, perceived trust, perceived risk, mobile banking usability, and mobile banking acceptance. The researchers used this model in Fig. 1 to evaluate the proposed hypothesis. Every construct is explained with the hypothesis below.

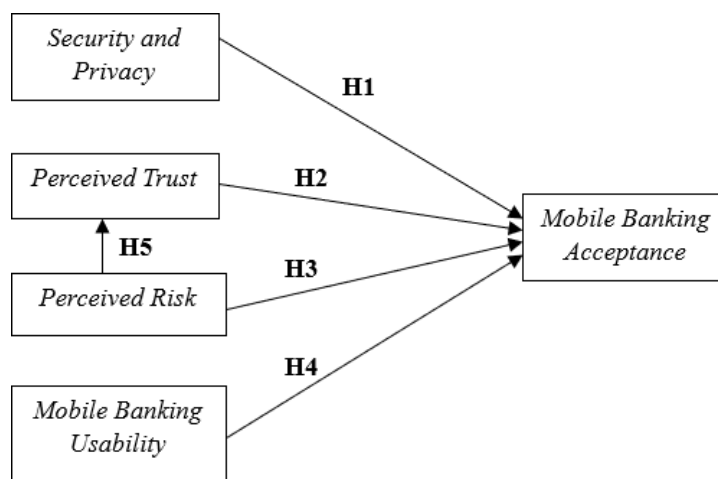


Figure 1. Research Model

2.1. Security and Privacy

The potential for loss or fraud to occur through the use of or if hackers have infiltrated a user of an online bank's system, while the activity of mobile banking transactions involves financial transactions, is defined as security and privacy [7]. Security refers to the general population's view of a mobile

banking service that safely handles financial transactions while maintaining consumers' confidential data [8]. Security is an essential consideration for companies that offer financial services, as it is linked to consumers who put and trust their money in the companies [9]. On the contrary, privacy points to the preservation of various types of data collected regardless of the users' knowledge throughout their interactions with mobile banking applications [10]. Internet user's privacy concerns are collection, control, and awareness of their online privacy [11]. Therefore, companies should clearly disclose to users how data are being collected, processed, and used [12]. As mobile banking promotes that financial transactions can happen wherever and whenever without having to contact physically, it could lead to more criminal acts in those behaviors [13]. This phenomenon, caused by security and privacy reasons, could lead to mobile banking consumers' reluctance to accept mobile banking [14]. Thus, it's very important to verify that users feel secure while making electronic financial transactions. As many previous studies have stated [15]–[17], security and privacy are the main elements in accepting mobile banking. Security and privacy are essential to mobile banking acceptance; hence, the hypothesis states:

H1: Security and Privacy have a significant effect on Mobile Banking Acceptance.

2.2. Perceived Trust

Perceived trust is an emotional state based on the other person's satisfying behavior that makes one want to trust them [18]. To use mobile banking services, a user must have confidence in the security and reliability of the technology used as the transaction medium [19]. Trust becomes a primary root when a user uses a new technology [20]. Trust also becomes a pivotal component of accepting technology because of some flaws in mobile banking applications, such as small screens, a limited amount of information, and slow transaction processes [21]. Previous research also emphasizes that 'trust is the most potent and essential factor affecting mobile banking acceptance' [22]–[26]. Building trust has become essential to influencing mobile payment systems because "maintaining an intimate connection with consumers is not easy, particularly given that there are fewer face-to-face contacts" [27]. However, trust is gradually becoming dynamic because consumer trust in non-face-to-face transactions will likely change. Those who recognize the ease and benefit of a system and possess a great extent of trust will be overt to new technology [21]. Therefore, the critical effect of trust can be stated as:

H2: Perceived Trust has a significant effect on Mobile Banking Acceptance.

2.3. Perceived Risk

Consumers' uncertainty, reluctance, or fear of potential risks due to their purchase decision is perceived risk [28]. The impalpability of mobile banking is the primary reason consumers need help evaluating services ahead of actual use [29]. Mobile banking as a remote service is viewed as having a higher risk than fixed devices [30]. Consumers believe that there is a greater chance of risk when much money is involved [31]]. In this context, online transactions, such as bill banking, are considered high risk because consumers cannot perform transactions face-to-face and have no way of knowing whether or not the transactions they performed were executed on time [8]. The following hypothesis stated as the following:

H3: Perceived Risk has a significant effect on Mobile Banking Acceptance.

2.4. Mobile Banking Usability

Mobile banking usability includes 2 crucial factors: perceived usefulness and perceived ease of use. These 2 factors focus on use and convenience, as how usability positively affected Internet banking usage [30]. Usability is how users feel and interact with a website and how the design enhances their use of it [32]. Regarding ease of use, bank clients, as users, will consider the time and effort required to learn and use mobile banking [33]. Regarding usefulness, bank clients as users will benefit from making payment transactions regardless of time and place [34]. Thus, usability in mobile banking refers to how

users perceive mobile banking applications to appear simple to use and relevant to their needs. As mobile banking usability is deeply involved in how easy and valuable mobile banking is to use, the hypothesis is stated as follows:

H4: Mobile Banking Usability has a significant effect on Mobile Banking Acceptance.

2.5. Perceived Risk and Trust

In the context of risk, trust is a person's readiness to accept susceptibility in the face of favorable expectations about another's intentions or behavior in a situation identified by mutual dependence and risk [35]. This definition consists of emotional and cognitive aspects of trust and so, consumer trust can be described as a function of the level of risk associated with the situation, and it is essentially necessary only in situations of uncertainty [36]. The user's perceived risk is critical because the greater the risk, the less the user desires to use the service, and vice versa. The trust that users feel also becomes essential because the greater the trust, the greater the user's desire to obtain advantages from mobile banking services [37]. Hence, the hypothesis is stated below:

H5: Perceived Risk has a significant effect on Perceived Trust in Mobile Banking Acceptance.

This study uses a survey, and the research questions were from Aboobucker & Bao c and had 25 questions. Throughout this research, we use simple random sampling as a sampling method. Each subject is chosen by itself from the other individuals in the population using simple random sampling, which gives each individual of the population a fair possibility of being chosen as a subject [38]. The survey was carried out by giving questionnaires to research subjects using Google Forms. This study's questionnaire is in English and translated into Indonesian for better understanding, and academics have validated it. The questionnaire was correctly interpreted in Indonesia with careful attention to ensure that it fits perfectly for the Indonesian context. We use the Slovin formula to collect samples from the entire population. From the population of 11.3 million users, we get a total sample of 400 respondents.

This study is divided into two parts. The first part is collecting general information of the respondent as complement information. The second part is a model collection of TAM constructs that were adopted from [31]. Each item was measured by a Likert scale from 1 (strongly disagree) to 5 (strongly agree). During the research period, descriptive statistics of 400 respondents' feedback were collected in Table 1, such as residential area, gender, and age, were collected in Table 1.

Table 1. Descriptive statistics of respondents

Measure	Value	Frequency	%
Residential area	West Surabaya	68	17
	East Surabaya	112	28
	South Surabaya	96	24
	North Surabaya	44	11
	Central Surabaya	80	20
Gender	Men	172	43
	Women	228	57
Age	17-30 years old	336	84
	More than 31 years old	64	16

3. Results and Discussions

The descriptive and analytical data are evaluated by SEM (Structural Equation Modeling), one of the statistical techniques used to evaluate validity and reliability with empirical data. SEM is often used, especially the evaluation model tested through various research. The variant of SEM that the researchers used is a variant-based technique using software called SmartPLS 3.0. SEM variant-based technique is

known to have fewer restrictions on sample size and residual distribution when compared to covariance-based methods. The analysis was carried out to evaluate the measurement model, the structural model, and the hypothesis testing.

Table 2. Factors loadings criteria

Construct	AVE	Composite reliability	Cronbach's alpha	Fornell-Larcker	Item	Loading factors
Security & Privacy	0.588	0.809	0.651	0.767	SP1	0.670
					SP2	0.864
					SP3	0.753
Perceived Trust	0.656	0.851	0.744	0.819	PT2	0.785
					PT4	0.798
					PT5	0.846
Perceived Risk	0.759	0.863	0.688	0.871	PR1	0.835
					PR3	0.907
					MBU1	0.759
Mobile Banking Usability	0.678	0.863	0.792	0.823	MBU2	0.830
					MBU3	0.877
					MBA3	0.736
Mobile Banking Acceptance	0.579	0.805	0.637	0.761	MBA4	0.795
					MBA5	0.752

3.1. Measurement Model

Various tests were classified in the measurement model, such as convergent validity, discriminant validity, and reliability indicators. The information in the Table is about Average Extracted Variance (AVE), Composite Reliability (CR), Cronbach's alpha, loadings factor (outer loading and loading factor), and p- p-values. All composite reliability and Cronbach's alpha values need to be above 0.7 to imply that an item is reliable. Furthermore, to show that the item is valid, the loading value must be beyond 0.5, and any load value less than 0.5 must be eliminated [30]. Due to low loading factors, some values are eliminated so the remaining values are those who have higher value than 0.5 and are statistically significant. Convergent validity is tested using AVE, whose minimum values accepted are at least 0.5 or higher than that.

Discriminant validity is analyzed using Fornell-Larcker criteria and cross-loading factors criteria. The Fornell-larger value demonstrates that each construct's AVE root squared value is higher than the association value between other constructs. For cross-loading, every item should present a higher loading value on the relevant factor rather than cross-loading on every other factor. Cross-loading criteria must be ensured by removing multiple items from each construct. Discriminant validity could be proven with the complete value of Fornell-Larcker and cross-loading. All results are shown in Table 2.

3.2. Structural Model

The structural model included various tests, such as r-square, f-square, Q-square, and VIF. These tests show any causality relationship between every latent construct. The r-square test determines if all related constructs affect the dependent construct's variance.

R-square tests examine dependent constructs, which in this research are perceived trust and mobile banking acceptance. The r-square of perceived trust is 0.083, explaining the effect of perceived risk on perceived trust, which is 8.3%. The r-square of mobile banking acceptance is 0.471, explaining the effect of security and privacy, perceived risk, perceived trust, and mobile banking usability on mobile banking acceptance, which is 47.1%.

This research also tests independent construct effects toward dependent constructs using f-square. There are several categories in the f-square test to determine the size of the effect, namely ≤ 0.02 (no effect size), ≥ 0.02 (small size), ≥ 0.15 (medium size), and ≥ 0.35 (large size). The constructs examined are security and privacy, perceived risk, perceived trust, and mobile banking usability toward mobile banking acceptance. The values of each construct are 0.03 (small size), 0.005 (no effect size), 0.309 (medium size), and 0.047 (small size).

A research model should have predictive relevance, which indicates the model's capacity to identify each latent endogenous construct's indicators. Good predictive relevance can be achieved using Q-square to assess the predictive validity of the latent construct. The predictive relevance of the research model is fulfilled if the Q-square value is above 0. The Q-square test of mobile banking acceptance and perceived trust are both higher than 0, indicating that the research model has good predictive validity.

Another test from the structural model is the variance inflation factor (VIF). The VIF test detects a condition where there is any collinearity correlation between constructs. There is no multicollinearity issue if the VIF values are smaller than 5. The correlation of every construct in the research model tested in VIF is smaller than 5, indicating no multicollinearity.

Table 3. Hypotheses results

	Original Sample (O)	Sample Mean (M)	T Statistics (O/STDEV)	p-value	Results
SP-MBA (H1)	-0.196	-0.170	0.088	0.027	Supported
PT-MBA (H2)	0.508	0.510	0.069	0.000	Supported
PR-MBA (H3)	0.094	0.060	0.115	0.410	Not supported
MBU-MBA (H4)	0.280	0.291	0.115	0.015	Supported
PR-PT (H5)	0.288	0.288	0.069	0.000	Supported

3.3. Hypotheses Testing

In order to examine typical pathways, hypothesis analysis and relationship become their basis. The hypothesis testing uses path coefficients and p-values to determine if the hypothesis is supported. The hypotheses are shown in Table 3 as we found our findings throughout the research. The highest effect on mobile banking acceptance is perceived trust, with the original sample of 0.508 and p-value < 0.005 (0.000). The second-place effect on mobile banking acceptance is mobile banking usability, with the original sample of 0.280 and p-value < 0.05 (0.015). The lowest effect on mobile banking is security and privacy, with the original sample of -0.196 and p-value < 0.05 (0.027). The other findings indicate a significant effect of perceived risk on perceived trust with the original sample of 0.288 and p-value < 0.05 (0.000). The only insignificant effect is the perceived risk on mobile banking acceptance with the original sample of 0.094 and p-value > 0.05 (0.410).

The technology acceptance model that Davis found can explain the acceptance of this research objective. Each step the researcher takes aims to determine whether each construct affected the acceptance of BNI mobile banking.

The result of testing how security and privacy affect mobile banking acceptance is that this research proposed a hypothesis, namely H1: Security and privacy significantly affect mobile banking acceptance. Hypothesis 1 has the original sample -0.196 (negative) and p-value 0.027 (≤ 0.05), and the result is supported. The hypothesis result is supported. The result is negative but significant. Therefore, users believe that when they use the BNI application, it will not pose a threat to their security and privacy. However, the higher the users worry about their security and privacy while using the BNI application, the lower they can accept the BNI application, and vice versa. This supported hypothesis aligns with previous research that security and privacy significantly affected the acceptance of mobile banking [33], [39]

Perceived trust toward acceptance of mobile banking technology tested by H2: Perceived trust significantly affects mobile banking acceptance. Hypothesis 2 has the original sample 0.508 (positive) and a p-value of 0.000 (≤ 0.05), and the result is supported. This hypothesis is supported by the result, which aligns with research by [31]. The research stated that perceived trust significantly affects acceptance of BNI mobile banking. Users must believe the application's transactions and personal information are completely secure. The higher the level they believe the mobile banking application is trusted, the easier for them to accept the application. While the mobile banking application possesses such personal information and data transactions, users must first believe that the whole process done in the application is secured.

The other hypothesis is perceived risk toward acceptance of mobile banking, as stated in H3: Perceived risk significantly affects mobile banking acceptance. Hypothesis 3 has the original sample 0.094 (positive) and p-value 0.410 (≥ 0.05), and the result is not supported. Unlike the other hypothesis, the result cannot show the significance of perceived risk on mobile banking applications. Mobile banking has significant challenges when operating in such a complex system, i.e., experience and maturity [40]. Such immaturity may allow risks related to unprotected networks, malware in mobile devices, applications from outside parties, and reckless user behavior [41]. This unsupported hypothesis result implies that higher uncertainty and fear regarding possible risk will disrupt user acceptance of mobile banking applications. Hence, perceived risk may negatively affect mobile banking acceptance if it cannot be handled properly, as risks must be managed in mobile banking. These results align with research by Aboobucker and Bao [31]

Acceptance of new technology, such as banking applications or services, has been tested through various research. To explain how users can accept the mobile banking application, the researcher is using usability to examine it. The proposed hypothesis is H4: Mobile banking usability significantly affects mobile banking acceptance. Hypothesis 4 has the original sample 0.280 (positive) and p-value 0.015 (≤ 0.05), and the result is supported. The result shows that the hypothesis is supported. While the hypothesis is supported, it shows that users feel that the BNI mobile banking application is convenient and helpful. The higher the users feel its usability, the higher it will be that they can accept the BNI mobile banking application.

To examine the effect of perceived risk on perceived trust in accepting mobile banking applications, this study proposed H5: Perceived risk and trust have significant effects on mobile banking acceptance. Hypothesis 5, which is perceived risk toward perceived trust, has the original sample of 0.288 (positive) and a p-value of 0.000 (≤ 0.05), and the result is supported. Perceived risk and trust are related to each other [19]. As a result, users are also frequently reminded about the importance of their trust in the banking service when providing information about sensitive and privacy issues [31]. It explains that the safer transaction risks users feel, the higher their trust in BNI mobile banking. This supported hypothesis result is in line with research conducted by [31].

4. Conclusion

According to the results and discussions presented, BNI mobile banking acceptance is determined by security and privacy, perceived trust, and mobile banking usability. Perceived risk is proven to be non-significant factor because risks may affected mobile banking negatively and improperly. The other research finding is perceived risk and perceived trust has significant effect toward acceptance, so it strengthen the correlation between the two constructs. This study is solely drawn into objective research, hence the measurement and complexity of respondents' business are not taken into consideration.

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