
ANALYSIS OF KEY DETERMINANTS OF MOBILE BANKING USAGE: A STRUCTURAL EQUATION MODELING (SEM) APPROACH BASED ON THE TECHNOLOGY ACCEPTANCE MODEL (TAM)



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Abstract

The financial services industry, particularly the banking sector, has experienced rapid growth in line with increasing consumer demands, competitive pressures, and technological advances. The innovations resulting from these dynamics play an important role in creating services that are easier to use and provide tangible benefits to users. These two perceptions are key to driving the wider and more sustainable adoption of digital banking services. This study aims to investigate the relationship between perceived ease of use, perceived usefulness, attitude, and intention to use regarding mobile banking usage. TAM is used as the primary theory in this study. The research methodology employs a quantitative approach with purposive sampling, yielding 250 samples. The research data was analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. The findings show that perceived ease of use significantly influences perceived usefulness, and both contribute positively to attitude. Furthermore, perceived usefulness was found to increase intention to use, which ultimately drives mobile banking usage in the use of mobile banking services. This study contributes to the marketing literature on the adoption of digital services by users, particularly in the context of mobile banking usage. Practically, this study emphasizes the importance of feature innovation, service quality improvement, and user experience optimization to enhance customer satisfaction, engagement, and loyalty amid the increasingly competitive digital banking services market. Practically, this research emphasizes the importance of developing user-friendly features that provide tangible benefits to users, to drive adoption and build customer loyalty in the face of increasingly competitive digital banking services.

Keywords: Perceived Ease of Use, Perceived Usefulness, Attitude, Intention to Use, Mobile Banking Usage, Mobile Banking

INTRODUCTION

The advancement of information and communication technologies (ICT), particularly the internet and wireless technology, has significantly transformed both business and non-business aspects of human life (Riptiono et al., 2021). The rapid growth in internet and smartphone usage has revolutionized service delivery methods across sectors (Jebarajakirthy & Shankar, 2021). Individuals increasingly rely on mobile services for communication, entertainment, and especially financial technology (FinTech) applications such as online shopping, mobile payments, and mobile banking (Ullah et al., 2022). The financial services industry, particularly banking, has undergone substantial transformation driven by technological innovation, competitive pressures, and evolving customer expectations (Ibrahim et al., 2022). To maintain competitiveness and meet customer demands, banks and financial institutions have adopted innovative electronic channels (Carranza et al., 2021). This shift has been accelerated by the pandemic, during which mobile banking (m-banking) became a primary channel for financial transactions (Apit et al., 2022).

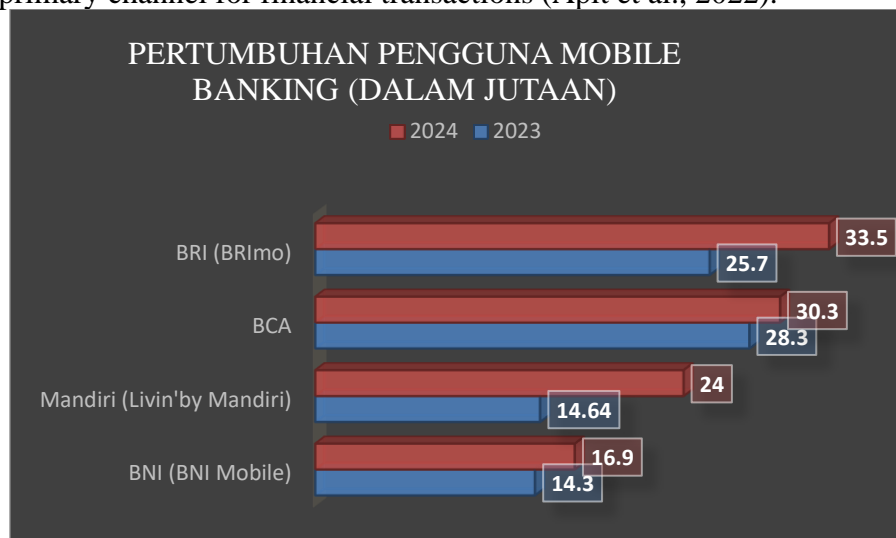


Figure 1.1 Growth of Mobile Banking Users (in Millions)

Source: Financial Bisnis, (2024)

As shown in Figure 1.1, mobile banking adoption in Indonesia has grown rapidly. In Q1 2024, Brimo recorded 33.5 million users, leading among Indonesian banks. BCA's mobile banking reached 30.8 million users by March 2024, an increase of 9% from the previous year. Mandiri reported 24 million users, reflecting a 39% year-on-year growth, while BNI recorded 16.9 million users, up 18.5% from the prior year (Financial Bisnis, 2024). M-banking is now the fastest-growing and most cost-effective channel for delivering banking services (Shankar et al., 2020). Compared to traditional banking, it offers greater convenience, accessibility, and efficiency (Sharma et al., 2022), evolving into a dominant platform for financial transactions (Kumar et al., 2020). Its portability makes it a successful successor to ATMs, internet banking, and point-of-sale systems (Yin & Lin, 2022). Moreover, m-banking addresses limitations of cash-based transactions, such as inconvenience and limited access to banking services (Ong & Chong, 2023).

Notably, digital banking adoption is particularly high among Generation Y (born 1981–1994) and Generation Z (born 1995–2012), who prefer mobile banking due to its speed, convenience, and 24/7 accessibility (Takács et al., 2021; Goodstats, 2024). However, technical issues such as system outages and connectivity problems have led to user dissatisfaction, as reported by CNN Indonesia (2024). These challenges highlight the risks of technological dependence and underscore the need for more stable, responsive, and user-friendly mobile banking systems. In the context of technology adoption, attitude reflects users' favorable or unfavorable evaluations toward using a system (Safari et al., 2022; Tamilmani et al., 2022). It plays a crucial role in shaping intention to use, with several studies confirming a positive influence (Himel et al., 2021; Juwita et al., 2023; Nguyen-Viet & Ngoc Huynh, 2021). However, some research reports no significant effect (Uyob et al., 2023), indicating inconsistent findings.

Intention to use refers to an individual's readiness to adopt or continue using a technology (Songkram et al., 2023; Ho et al., 2020). It is a strong predictor of actual usage behavior (Liu et al., 2022) and has been found to significantly influence mobile banking adoption (Hooda et al., 2022; Jadil et al., 2021; Khan & Abideen, 2023). According to the Technology Acceptance Model (TAM), perceived ease of use (PEOU) and perceived usefulness (PU) are key determinants of user acceptance. PEOU refers to the degree to which users believe the system is easy to operate (Chua & Yu, 2024). It positively influences both attitude and perceived usefulness in many studies (Al Amin et al., 2022; Almaiah et al., 2023; Abdennebi, 2023), though some findings report non-significant relationships (Ho et al., 2020; Uyob et al., 2023). Similarly, PU reflects the extent to which users believe the technology enhances their performance (Siagian, Tarigan, Basana et al., 2022; Alnemer, 2022). It significantly affects both attitude and intention to use in various studies (Himel et al., 2021; Hassan & Wood, 2020; Ullah et al., 2022), though contradictory results exist (Perumal et al., 2022; Mailizar et al., 2021).

Mobile banking usage refers to the actual frequency and continuity of service utilization (Jadil et al., 2021; Y. B. Zhang, 2021). It is shaped by user attitudes, intentions, and perceptions of ease and usefulness (Tariq et al., 2024). Despite extensive research, findings remain inconsistent, revealing gaps in understanding the relationships among these variables. Therefore, this study aims to re-examine these relationships and identify the key determinants of mobile banking adoption. This study contributes by empirically testing and clarifying the interplay between PEOU, PU, attitude, intention, and actual usage in the Indonesian mobile banking context.

REVIEW OF LITERATURE

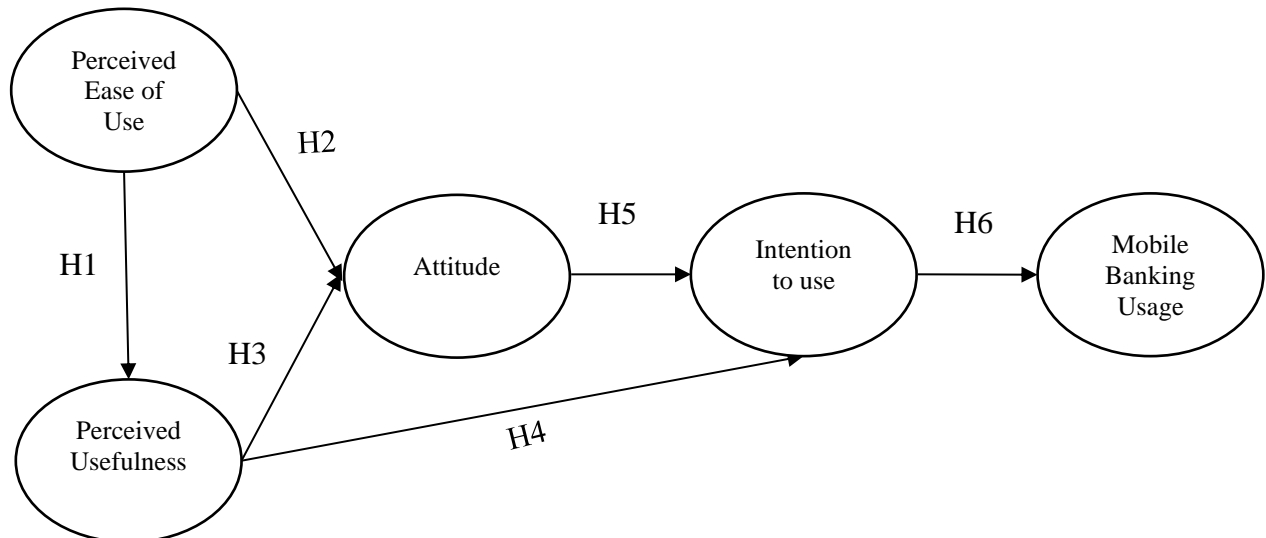
Technology Acceptance Model (TAM)

This study is grounded in the Technology Acceptance Model (TAM) (Davis, 1989), one of the most widely used frameworks for understanding technology adoption. TAM posits that user acceptance is primarily influenced by two cognitive beliefs: perceived usefulness (PU) and perceived ease of use (PEOU). PU refers to the extent to which an individual believes that using a system will enhance their performance, while PEOU reflects the degree to which the system is perceived as effortless to operate (Davis, 1989; Venkatesh & Davis, 2000). These constructs originate from the Theory of Reasoned Action (TRA) and Theory of

Planned Behavior (TPB), providing a solid theoretical foundation for predicting behavioral intention and usage (Marangunić & Granić, 2015).

TAM has been extensively applied in mobile banking research due to its effectiveness in explaining user intentions and actual usage behaviors (Nguyen et al., 2020; Alnemer, 2022). It offers valuable insights into how users' perceptions translate into attitudes, intentions, and ultimately, adoption of digital banking services. Given its strong empirical support and contextual relevance, TAM is adopted in this study to examine the determinants of mobile banking usage in Indonesia.

Hypothesis Development



H1: Perceived ease of use positively influences perceived usefulness.

PEOU is a key antecedent of PU, as users tend to perceive a system as more useful when it is easy to use (Davis, 1989). Empirical studies in mobile banking contexts such as in Vietnam (Phan Chung et al., 2023), China (Siyal et al., 2019), and Tunisia (Abdennebi, 2023) consistently confirm this positive relationship. When mobile banking apps are user-friendly, customers are more likely to view them as beneficial. Thus, H1 is proposed.

H2: Perceived ease of use positively influences attitude.

A system that is easy to use fosters positive user evaluations. Research in Cambodia (B. Ly & Ly, 2022), Malaysia (Ariffin et al., 2021), and Myanmar (Thanabordeekij et al., 2020) shows that PEOU significantly enhances user attitude toward mobile banking. Intuitive interfaces reduce cognitive effort and frustration, leading to favorable perceptions. Hence, H2 is posited.

H3: Perceived usefulness positively influences attitude.

Users develop positive attitudes when they believe a technology improves their efficiency. Studies in Saudi Arabia (Almaiah et al., 2023), Bangladesh (Purohit & Arora, 2023), and Mongolia (Yung-Chi et al., 2020) confirm that PU strengthens user attitude. Therefore, H3 is proposed.

H4: Perceived usefulness positively influences intention to use.

According to TAM, PU is a primary driver of behavioral intention. Evidence from Ghana (Kelly & Palaniappan, 2023), Jordan (Rawwash et al., 2020), and South Korea (Kim

& Kim, 2022) supports this link in digital financial services. Users are more likely to adopt mobile banking if they perceive it as beneficial. Thus, H4 is formulated.

H5: Attitude positively influences intention to use.

A favorable attitude increases the likelihood of technology adoption. Studies in Bangladesh (Himel et al., 2021), Malaysia (Mohamad et al., 2023), and Spain (Irimia-Diéguez et al., 2023) confirm that positive attitudes significantly shape intention to use mobile banking. Therefore, H5 is proposed.

H6: Intention to use positively influences mobile banking usage.

Behavioral intention is a strong predictor of actual usage. Empirical findings by Jadir et al. (2021), Carranza et al. (2021), and Mensah & Khan (2024) consistently show that higher intention leads to greater mobile banking engagement. Thus, H6 is established.

RESEARCH METHOD

This study employs a quantitative approach to examine causal relationships among variables using primary data collected through an online survey. A structured questionnaire was distributed via Google Forms and shared through social media platforms including WhatsApp, Instagram, X (Twitter), and TikTok to reach a broader audience. Purposive sampling was used to select respondents who meet predefined criteria: (1) residents of Indonesia, (2) aged between 18-45 years (covering Generation Y and Z), and (3) active users of mobile banking. The focus areas include DKI Jakarta, West Java, Central Java, East Java, and the Special Region of Yogyakarta regions identified by Goodsate Data (2023) as having the highest concentration of bank customers in Indonesia. The research model comprises two independent variables perceived ease of use (PEOU) and perceived usefulness (PU) and three dependent variables: attitude, intention to use, and mobile banking usage. All constructs were measured using a five-point Likert scale adapted from Carranza et al. (2021), ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The scale items were developed based on prior literature and operationalized into measurable indicators (Sekaran & Bougie, 2020).

RESULTS AND DISCUSSION

Descriptive Profile of Respondents

This study collected data from 250 respondents via an online survey using Google Forms, distributed through social media platforms. The sample was drawn from major Indonesian regions DKI Jakarta, West Java, Central Java, East Java, and Yogyakarta due to their high concentration of bank customers (Goodsate Data, 2023).

Gender

Respondents were evenly distributed: 48% male (n = 120) and 52% female (n = 130), indicating a slight majority of female users in mobile banking adoption.

Age

The majority (54%) were aged 21–29, followed by 16% aged 12–20, 22% aged 30–36, and 9.2% aged 37–43. This reflects strong adoption among younger generations.

Education Level

Most respondents held a bachelor's degree (S1) or equivalent (48.4%), followed by high school graduates (29%). Higher education levels suggest greater digital literacy.

Occupation

The largest group consisted of students (38%), followed by employees (28%) and civil servants/state-owned enterprise workers (26%).

Income

The dominant income bracket was Rp 2.500.001–Rp 4.000.000 (40%), followed by Rp 1.000.001–Rp 2.500.000 (24%). This indicates moderate-income users as the primary adopters.

Descriptive Analysis of Variables

Descriptive statistics for all constructs are presented in Table 4.6. Mean scores were calculated based on a 5-point Likert scale.

Table 1. Descriptive Scale Assessment Range Variables

Assessment Range	Description
1,00-1,83	Strongly Disagree
1,84 –2,66	Disagree
2,67–3,49	Somewhat Disagree
3,50–4,32	Somewhat Agree
4,33–5,15	Agree
5,16–6,00	Strongly Agree

All variables showed mean values above 4.33, indicating generally positive perceptions across constructs:

1. Perceived Ease of Use (PEU): Mean = 4.48
2. Perceived Usefulness (PU): Mean = 4.74
3. Attitude: Mean = 4.79
4. Intention to Use (IU): Mean = 4.86
5. Mobile Banking Usage (MBU): Mean = 4.57

These results suggest high user satisfaction and favorable attitudes toward mobile banking.

Measurement Model (Outer Model)

Validity

Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE). All items had outer loadings > 0.50 (Hair et al., 2019), and AVE values exceeded 0.50, confirming convergent validity (Table 4.12–4.13). Discriminant validity was tested using the Fornell-Larcker criterion and the HTMT ratio. Square roots of AVEs were higher than inter-construct correlations, and all HTMT values were below 0.85 (Henseler et al., 2015), satisfying discriminant validity.

Reliability

The reliability of the measurement items was assessed using Cronbach’s Alpha. As shown in Table 3.8, all constructs achieved alpha values above 0.70, indicating satisfactory internal consistency (Hair et al., 2019). Perceived Ease of Use ($\alpha = 0.871$), Perceived Usefulness ($\alpha = 0.914$), Attitude ($\alpha = 0.936$), Intention to Use ($\alpha = 0.870$), and Mobile Banking Usage ($\alpha = 0.856$) all met the threshold, confirming the reliability of the instrument for the main study.

Structural Model (Inner Model)

Multicollinearity

VIF values ranged from 1.000 to 2.634, all < 5 , confirming no multicollinearity issues (Hair et al., 2021).

R-Square

R² values indicated strong explanatory power:

- Attitude: 64.2%
- Intention to Use: 60.3%
- Perceived Usefulness: 19.8%
- Mobile Banking Usage: 8.7%

These suggest that exogenous variables significantly explain variations in attitude, intention, and usage.

Path Coefficients

All hypothesized relationships were significant at $p < 0.05$ and $T > 1.96$:

Hypothesis	β	T- statistic	P-value	Conclusion
PEU → PU	0,445	6,713	0,000	H1 is accepted and significant.
PEU → ATT	0,166	3,259	0,001	H2 is accepted and significant.
PU → ATT	0,714	15,566	0,000	H3 is accepted and significant.
PU → IU	0,267	2,235	0,025	H4 accepted and significant.
ATT → IU	0,549	4,118	0,000	H5 is accepted and significant.
IU → MBU	0,294	4,384	0,000	H6 is accepted and significant.

All paths were positive and significant, confirming the proposed model.

Discussion

Perceived Ease of Use → Perceived Usefulness

Perceived ease of use significantly enhances perceived usefulness ($\beta = 0.445$, $p = 0.000$). This supports TAM, which posits that ease of use strengthens users’ belief in a technology’s benefits (Davis, 1989). When mobile banking is intuitive and effortless, users perceive it as more valuable. This aligns with Abdennebi (2023) and Phan Chung et al. (2023), who found that usability directly boosts perceived utility. Thus, user-friendly design is critical in shaping functional value perception.

Perceived Ease of Use → Attitude

Ease of use positively influences user attitude ($\beta = 0.166$, $p = 0.001$). A seamless experience reduces cognitive and technical barriers, fostering positive evaluations (Ariffin et

al., 2021). When users do not require assistance or face operational difficulties, they develop trust and comfort, leading to favorable attitudes. This finding reinforces TAM's assertion that ease of use shapes affective responses, encouraging technology acceptance (Yamin & Abdalatif, 2024).

Perceived Usefulness → Attitude

Perceived usefulness has a strong positive effect on attitude ($\beta = 0.714$, $p = 0.000$). Users who believe mobile banking improves efficiency and productivity form more positive attitudes. This is consistent with Flavián et al. (2020) and Kelly & Palaniappan (2023), emphasizing that functional benefits drive emotional and cognitive acceptance. The high β value indicates that usefulness is a stronger driver of attitude than ease of use.

Perceived Usefulness → Intention to Use

Usefulness significantly increases intention to use ($\beta = 0.267$, $p = 0.025$). Users are more likely to adopt mobile banking if they perceive tangible benefits in daily financial management. This supports TAM and prior studies (Ayyub et al., 2020; Ullah et al., 2022), confirming that performance improvement beliefs are central to behavioral intention. Service providers should emphasize functional advantages to strengthen adoption intent.

Attitude → Intention to Use

Attitude strongly influences intention ($\beta = 0.549$, $p = 0.000$). Positive evaluations significantly increase the likelihood of adoption, consistent with Irimia-Diéguez et al. (2023) and Ly & Ly (2022). When users view mobile banking as convenient, secure, and efficient, they are more motivated to use it. This confirms that affective responses mediate cognitive intentions in technology adoption.

Intention to Use → Mobile Banking Usage

Intention significantly predicts actual usage ($\beta = 0.294$, $p = 0.000$), supporting the Theory of Planned Behavior and TAM extensions. This aligns with Carranza et al. (2021) and Sultana et al. (2023), confirming that behavioral intention is a key precursor to real-world technology use. Strong intent, driven by perceived benefits and positive attitudes, translates into consistent mobile banking engagement.

CONCLUSION

This study confirms that perceived ease of use and perceived usefulness significantly influence attitude and intention to use, which in turn drive mobile banking adoption, supporting the Technology Acceptance Model (TAM) in the Indonesian digital banking context. Findings reveal that ease of use enhances perceived usefulness and fosters positive attitudes, while perceived usefulness strongly shapes both attitude and behavioral intention, ultimately increasing actual usage. The model demonstrates strong explanatory power, with attitude and intention explained by 64.2% and 60.3% of variance, respectively. Theoretically, this study reinforces TAM's applicability in digital finance, particularly among Generation Y and Z. Practically, it suggests that banks and fintech providers should prioritize user-friendly design, functional benefits, and trust-building to strengthen adoption. However, the study is limited to younger, tech-savvy users, limiting generalizability to older generations. Future research should expand the demographic scope and incorporate external variables such as trust, perceived risk, and security concerns. Longitudinal studies are also recommended to examine evolving user behaviors in response to technological advancements and service innovations.

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