

## Which UTAUT Elements Drive Mobile Banking Adoption in Indonesia, Despite Security and Trust Concerns?

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### Abstract

*Mobile banking is easier and more practical than traditional banking, but problems with cyber security and trust exist. The purpose of this study was to investigate the factors that influence Indonesian consumers' intention to use mobile banking. This study integrated the unified theory of acceptance and use of technology model with security and trust and uses education level as a moderating variable. This study involved 482 Indonesian participants who had used mobile banking, with primary data obtained through a structured questionnaire. Data analysis was carried out using partial least squares structural equation modeling. The results showed that at a significance level of 5%, performance expectancy, effort expectancy, social influence and system quality had a positive and significant effect on consumers' intention to use mobile banking. Meanwhile, security and trust had a positive but insignificant effect. Education level was able to moderate only the effect of social influence on consumers' intention to use mobile banking. The implication of this study is that policymakers can create important strategies. In addition, the government can create policies that support a sense of security for users.*

**Keywords:** UTAUT, performance expectancy, effort expectancy, education level, mobile banking.

### Introduction

The recent COVID-19 outbreak has accelerated digital trends, changing markets and consumer behaviour (Bausch et al., 2021). Innovative digital applications offered by mobile banking provide convenience, allowing people to transact from anywhere through 24-hour applications. Mobile banking is becoming increasingly popular as a cutting-edge method of providing financial services (Thusi and Maduku, 2020). The features and sophistication of smartphones also greatly help consumer behaviour in using mobile banking.

Users can access and perform financial services through mobile devices, including making payments, transferring money and managing bank accounts anywhere and anytime (Akhter et al., 2020), which significantly helps banks save costs (Ho et al., 2020; Gu et al., 2009). Users can save time by completing transactions related to their bank accounts at home (Singu & Chakraborty, 2022). However, cyber fraud in mobile banking is a concern for the public.

A new technology is not immediately accepted by the community. Intentions may lead individuals to evaluate, try and adopt the technology. Research on technology acceptance has utilised various theoretical principles, such as the theory of planned behaviour (TPB), the unified theory of acceptance and use of technology (UTAUT) and the technology acceptance model (TAM). UTAUT, developed by Venkatesh et al. (2012), contributes approximately 70% of the variation in consumer willingness to accept new technology.

UTAUT has been applied in research on consumer behaviour regarding fintech services, such as e-commerce (Haryanti & Subriadi, 2022; Chen et al., 2021), internet banking (Almaiah et al., 2022) and cloud computing (Tella et al., 2020; Matar et al., 2020). Additionally, it has been employed in mobile banking

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research in India (Singu & Chakraborty, 2022; Samartha et al., 2022), Mongolia (Ivanova & Kim, 2022) and Saudi Arabia (Almutairi et al., 2022).

Performance expectancy and effort expectancy have a significant effect on intention to use and usage of digital banking (Nguyen et al., 2020) but are not significant according to Anggraeni et al. (2021). Performance expectancy and social influence have a strong favourable effect on the desire to use digital banking (Harahap et al., 2023). Effort expectancy is related to perceived ease of use from TAM, that is, how easy it is for an individual to use the system (Oye et al., 2014). De Leon (2019) found that perceived ease of use has a statistically significant positive effect on behavioural intention to use mobile banking. However, Yu (2012) showed that effort expectancy is not the main factor that influences the intention to adopt mobile banking. This finding is in line with other mobile banking studies (Koenig-Lewis et al., 2010), which concluded that perceived usefulness does not affect consumer intention to adopt mobile banking. Many researchers have found that security quality positively and significantly affects consumer intention (Chiu et al., 2017; Chawla et al., 2019). However, Merhi et al. (2019) found that security quality negatively and significantly affects consumer intention. Studies have shown that a lack of trust and confidence is a significant barrier to mobile banking usage, particularly concerning the security of smartphone-based mobile banking transactions (Muñoz-Leiva et al., 2010). In addition, trust in banks is an important factor in Vietnam (Nguyen et al., 2020).

Demographic factors play a role in mobile banking adoption (Mishra & Singh, 2015). Education level, as one of the demographic factors, is important in shaping users' attitudes and behavioural intentions towards technology use (Chawla & Joshi, 2020). Consumers with higher levels of education tend to be more receptive to mobile banking than consumers with lower levels of education (Cao et al., 2018).

Highly educated individuals often have higher standards and are more critical when evaluating technology. The role of education as a moderating variable has been investigated in domains outside of mobile banking, namely, on the intention to use internet banking (Rashid et al., 2021). Given the lack of documentation on the impact of education, Abdinoor & Mbamba (2017) suggest further investigation on predicting consumer acceptance of mobile banking.

The main objective of this study is to establish a theoretical framework to determine consumer intention and provide deeper insights into how education moderates mobile banking adoption. This framework will integrate the UTAUT model along with two additional variables (trust and security). In addition, this study aims to provide deeper insights into how education moderates mobile banking adoption. This study can enrich the technology adoption literature by providing empirical evidence for mobile banking services in Indonesia, which is expected to increase user participation in the digital economy system, especially in the banking sector.

## Literature review and Hypotheses Development

Venkatesh et al. (2003) introduced UTAUT model by combining several models and ideas to characterise technology adoption. It explains the various elements that influence people's intentions and actions around technology development. As determinants of technical acceptance, it includes social influence, performance expectancy, facilitating conditions and effort expectancy. In different situations, it has been used to understand user intentions and behaviours in e-commerce (Chen et al., 2021) and mobile banking (Singu & Chakraborty, 2022).

Although UTAUT can predict aspects of technology utilisation, this model still needs to be improved. For example, according to the research objectives, adding more constructs can improve the ability to explain indications of technology acceptance.

### *1. Performance expectancy*

Performance expectancy measures the extent to which individuals believe that utilising a system would enhance productivity at work (Venkatesh et al., 2012). Kumar et al. (2017) showed that management

students' propensity to utilise mobile banking was strongly affected by their perceived utility of the service. Perceived utility is recognised as a significant element that affects the desire to utilise information technology and significantly influences the behavioural intention to utilise mobile banking. Individuals who perceive mobile banking as beneficial are more inclined to embrace this service. This finding aligns with the research by Hariyanti et al. (2020), which demonstrated that performance expectancy significantly influences behavioural intention. This idea indicates that an increase in the benefits derived by customers from the mobile banking application correlates with a heightened interest in utilising the application.

H1: Performance expectancy has a positive and significant effect on consumers' intention to use mobile banking.

## *2. Effort Expectancy*

Effort expectancy is the ease of using a system (Venkatesh et al., 2012). Park et al. (2007) and Lu et al. (2009) support the idea that effort expectancy significantly influences human intention to use mobile technology or services. This concept is in line with research conducted by Hariyanti et al. (2020), which found that effort expectancy has a positive and significant effect on behavioural intention. This idea shows that the greater ease people feel when using a mobile banking application corresponds to their increased interest in using the application.

The intensity of use and interaction between users and the system can indicate ease of use. Therefore, the more often the service system is used, the better the system is known and easily operated by its users. In practice, perceived ease of use is one component of effort expectancy where if a technology is considered easy to use (high perceived ease of use), then effort expectancy will also be high, as indicated in the research of de Leon (2019).

H2: Effort expectancy has a positive and significant effect on consumers' intention to use mobile banking.

## *3. Social Influence*

Social influence is the opinion of others that is considered important in determining whether users will use new technology (Venkatesh et al., 2012). Shia (2015) defines social influence as 'the degree to which a person believes that others think they should use e-commerce services'. Ratten (2010) said that people often learn by observing others in their social group when using new technology.

H3: Social influence has a positive and significant effect on consumers' intention to use mobile banking.

## *4. System Quality*

System quality is one measure of technology's ease of use (Ofori et al., 2017), describing the presence of specific features such as ease of use, flexibility, and attractive design (Upadhyay & Jahanyan, 2016). Good system quality attracts user interest. Singu and Chakraborty (2022) found that this quality support factor significantly affects the intention to use it. Therefore, the following hypothesis is proposed.

H4: System quality has a positive and significant effect on consumers' intention to use mobile banking.

## *5. Security*

Security is defined as the extent to which a user believes that using a particular online payment channel is safe (Chawla & Joshi, 2019). Mobile wallets involve the storage and transfer of personal and financial information, which is why they raise greater security concerns than conventional payment methods do (Chawla & Joshi, 2019). These concerns are more likely due to the vulnerability of possible data leaks or theft by hackers; for example, personal or financial information can be exposed and used for fraudulent activities (Merhi et al., 2019). It stands to reason that reducing security concerns can increase consumers' intention to use mobile banking.

H5: Security has a positive and significant effect on consumers' intention to use mobile banking.

### 6. *Trust*

Trust is the willingness to use a product or service with positive assumptions such as confidence or assurance despite concerns about risk (Jouda, 2020). Where trust in technology is lacking, the technology will not be adopted (Wu, 2023). When bank customers feel that the mobile banking provider has sufficient capability to ensure customer interests and performance meets customer expectations, then customers intend to continue using the mobile banking application (Jarad, 2022). Many researchers have found that trust positively and significantly affects consumer intention to use mobile banking (Hasan et al., 2024; Wu, 2023; Jouda, 2020; Silano et al., 2023; Jason Lim et al., 2017; Jarad, 2022; Merhi et al., 2019; Abu-Taieh et al., 2022). However, Chawla & Joshi (2019) found that trust affects consumer intention positively but not significantly. Meanwhile, Singh & Srivastava (2018) found that trust has a negative impact on consumer intention, although this impact is not significant. This raises the assumption that trust has a positive impact on consumer intention to use mobile banking.

H6: Trust has a positive and significant effect on consumers' intention to use mobile banking.

### 7. *Education Level*

In a study conducted by Abu-Shanab (2011), as a moderator, education significantly influenced four relationships with behavioural intention; performance expectancy, self-efficacy, perceived trust and locus of control. This is also in line with the research of de Leon (2019), which found that the influence of occupational attainment resulted in high school graduates having lower intentions to adopt mobile banking compared with respondents with undergraduate and postgraduate degrees.

H7: Education level significantly moderates the influence of performance expectancy on consumers' intention to use mobile banking.

H8: Education level significantly moderates the influence of effort expectancy on consumers' intention to use mobile banking.

H9: Education level significantly moderates the influence of social influence on consumers' intention to use mobile banking.

H10: Education level significantly moderates the influence of system quality on consumers' intention to use mobile banking.

H11: Education level significantly moderates the influence of security on consumers' intention to use mobile banking.

H12: Education level significantly moderates the influence of trust on consumers' intention to use mobile banking.

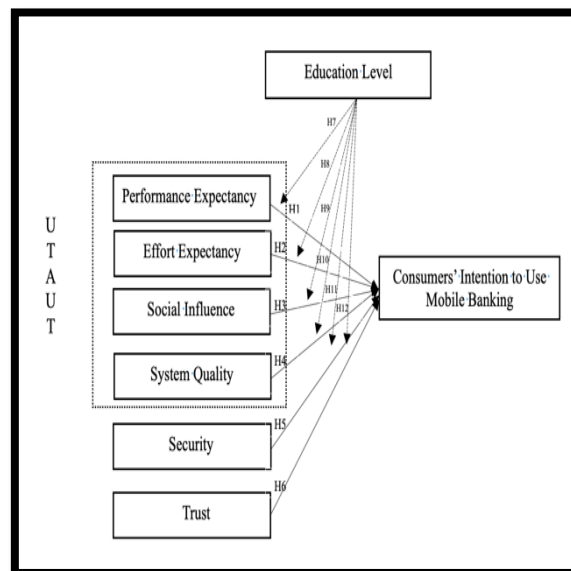
### 8. *Intention to accept fintech services*

Behavioural intention refers to the tendency and readiness of users to accept new services or products (Venkatesh et al., 2012). This concept is important in determining how well someone intends to use technology to improve performance. Intention also reflects the actual behaviour of users and can determine the likelihood that someone will use a technology. Users are more likely to initiate and maintain mobile banking services if they have positive intentions. Merhi et al. (2019) and Venkatesh et al. (2012) emphasise the importance of behavioural intention in driving technology use or effective user adoption. Therefore, behavioural intention is a suitable dependent variable for mobile banking use.

## **Theoretical framework**

Indonesian customers' intention to use mobile banking is assessed using seven variables in this study (Figure 1). UTAUT consists of four basic elements: Performance Expectancy, Effort Expectancy, Social Influence, and System Quality. This study incorporates two additional variables, namely, Security and Trust. Consumer behavioural intention is the dependent variable that measures the extent to which users in Indonesia are inclined to adopt mobile banking services. Education level functions as a moderator that can affect the independent and dependent variables.

Figure 1. Theoretical



framework

## Methodology

This study is a quantitative study that examines the influence of UTAUT elements as well as security and trust on consumers' intention to use mobile banking, with education level as a moderating variable. The population of this study is Indonesian people who have bank accounts and have made mobile banking transactions. Since every variable in our study is reflective, variable Y has the largest number of incoming arrows in its construct (Hair et al., 2019). As a result, 10 times the number of indicators for variable Y, or  $10 \times 6 = 60$ , is the minimum sample size. We used a sample size that was greater than necessary. In particular, 482 samples were taken from citizens of Indonesia. The independent survey method was used and prepared before being disseminated traditionally and online using the messaging service WhatsApp.

Seven latent variables are used in this study, the interval scale of which is measured using a seven-point Likert scale (1 = strongly disagree and 7 = strongly agree). In addition, there is an ordinal scale variable, namely, education level.

SmartPLS software version 4.0 was used in this research. PLS-SEM and bootstrapping were used to analyze consistency to determine the influence of each independent factor on intention. As a moderator between consumer intention to use mobile banking and independent variables, education level acts as a control variable.

## Research Instruments And Measurements

Table 2. Variables, indicators and measurements

Variable	Indicator
Performance expectancy (X <sub>1</sub> )	X <sub>1.1</sub> Usability in banking transactions X <sub>1.2</sub> Ease of handling transactions X <sub>1.3</sub> Efficiency of mobile online usability
Effort expectancy (X <sub>2</sub> )	X <sub>2.1</sub> Ease of following mobile banking steps X <sub>2.2</sub> Ease of becoming proficient in using mobile banking X <sub>2.3</sub> Clarity of interacting with mobile banking
Social influence (X <sub>3</sub> )	X <sub>3.1</sub> Influence of people on intention to use mobile banking X <sub>3.2</sub> Influence of friends who already use mobile banking X <sub>3.3</sub> Advice from important people in life to use mobile banking
System quality (X <sub>4</sub> )	X <sub>4.1</sub> Mobile banking functions that comply with technical specifications X <sub>4.2</sub> Easy-to-use navigation X <sub>4.3</sub> Clear access site layout
Security (X <sub>5</sub> )	X <sub>5.1</sub> Online banking services in protecting user payments X <sub>5.2</sub> Online banking services can guarantee the security of payment information X <sub>5.3</sub> Sense of security in transacting using mobile banking services
Trust (X <sub>6</sub> )	X <sub>6.1</sub> Belief that banks act in the best interests of users X <sub>6.2</sub> Belief in the transparency of online banking platforms X <sub>6.3</sub> Belief that the legal framework for mobile banking can provide adequate protection
Consumers' intention to use mobile banking (Y <sub>1</sub> )	Y <sub>1.1</sub> Intention to use mobile banking service if one has access to it Y <sub>1.2</sub> Intention to use mobile banking service if the cost and time are reasonable Y <sub>1.3</sub> Willingness to use mobile banking in the future
Variable	Indicator
Education level (M)	1 = No formal education 2 = High school 3 = Diploma 4 = Bachelor's degree 5 = Master's degree 6 = Doctorate

## Research Results

Table 3 shows the demographic profile of the respondents. Most of the respondents are young, female, single undergraduate students who work, have an income below Rp.6,670,000 and use mobile banking quite often.

Table 3. Demographic profile

Demographic	Item	Frequency	%
Gender	Male	165	34.2
	Female	317	65.8
Age	< 25 years	319	66.2
	26–41 years	109	22.6
	42–57 years	49	10.2
	58–76 years	5	1.0
Education	No formal education	3	0.6
	High school	166	34.4
	Diploma	18	3.7
	Undergraduate	210	43.6
	Master	72	14.9
	Doctorate	13	2.7
	Total	482	100.0

Data analysis in this study uses a two-level evaluation approach. The first stage determines the reliability and validity of each variable in the measurement model. The second stage assesses the structural model.

### Measurement Model

The assessment of the measurement model involves two main factors, namely, convergent validity and discriminant validity. Convergent validity aims to measure whether constructs are highly correlated with each other. This model uses an acceptable factor loading measure of above 0.708 ( $FL > 0.708$ ). The average variance extracted (AVE) is above 0.50 ( $AVE > 0.50$ ), and the composite reliability is above 0.80 ( $CR > 0.80$ ). The Cronbach's alpha is greater than 0.7, indicating that the reliability requirements were met. These results indicate that the convergent validity of this model is acceptable.

The next assessment factor is discriminant validity, which measures whether the construct is unique and can capture different phenomena. The discriminant validity model in this study is assessed by using the heterotrait–monotrait (HTMT) ratio. The acceptable assessment size with HTMT is less than 0.85 ( $HTMT < 0.85$ ). All constructs meet these criteria. Thus, the discriminant validity model is considered good.

### Structural Model

Analysing the structural model allows the formation of assumptions and conceptual models. The variance inflation factor (VIF) is not greater than 5 or 10 ( $VIF < 5$  or  $10$ ) which indicates that the model does not experience multicollinearity.

Table 4 presents the value of the path analysis of this research. Hypothesis testing in this research found that performance expectancy (H1), effort expectancy (H2), social influence (H3) and system quality (H4) positively and significantly affect consumer intentions to use mobile banking. H1 has the most significant path coefficient value ( $\beta = 0.283$ ) with a p-value below 0.05 ( $\text{sig} = 0$ ), followed by H2 ( $\beta = 0.232$ ), H4 ( $\beta = 0.141$ ) and H3 ( $\beta = 0.135$ ). The hypotheses related to security (H5) and trust (H6) in this model are rejected. Education level acts as a moderator in the model, with a significance level of 5%. The p-value in the table shows that education level can only moderate social relationships with consumer intentions to use mobile banking (H9) ( $\text{sig} = 0.003$ ). This means that in the context of moderation, only H9 can be accepted.

Table 4. Structural model

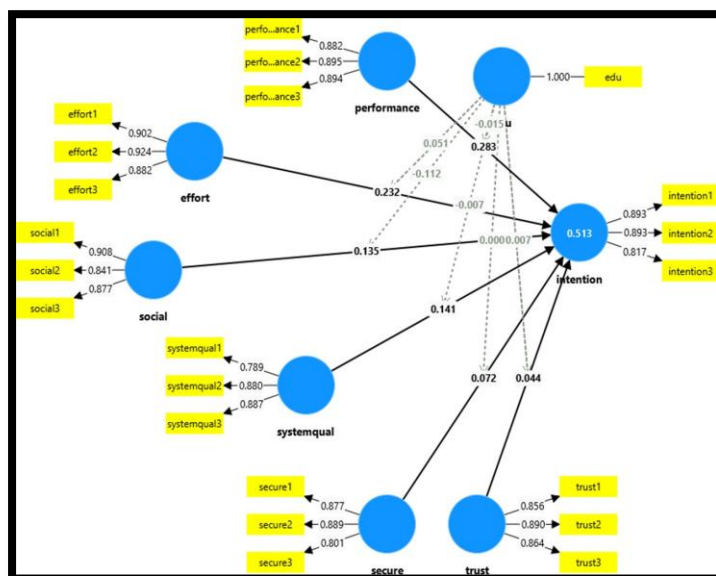
Hypotheses	Path coefficient	SD	t- statistics	sig	Decision	VIF	R <sup>2</sup>	F <sup>2</sup>	Q <sup>2</sup>
Performance–intention (H1)	0.283	0.054	5.191	0	Supported	2.427	0.513	0.068	0.469
Effort–intention (H2)	0.232	0.063	3.668	0	Supported	2.637		0.042	
Social–intention (H3)	0.135	0.036	3.733	0	Supported	1.267		0.029	
System quality–intention (H4)	0.141	0.054	2.619	0.004	Supported	2.112		0.019	
Security–intention (H5)	0.072	0.048	1.505	0.066	Not supported	1.834		0.006	
Trust–intention(H6)	0.044	0.054	0.81	0.209	Not supported	2.076		0.002	
Education× performance–intention(H7)	-0.015	0.058	0.25	0.401	Not supported				
Education × effort–intention(H8)	0.051	0.073	0.692	0.244	Not supported				
Education × social–intention(H9)	-0.112	0.041	2.76	0.003	Supported				
Education ×	-0.007	0.048	0.153	0.439	Not				



system quality– intention (H10)					supported				
Education × security– intention(H11)	0.000	0.055	0.001	0.5	Not supported				
Education × trust– intention(H12)	-0.007	0.054	0.118	0.453	Not supported				

The R2 value of consumer intention from Table 4 is 0.513. Effect size (F2) measures the effect of predictors (independent variables) in the model, which means they have a relative contribution to the change in the R2 value. The size of F2 is small (0.02), medium (0.15) and large (0.35). The PLS Predict procedure in data analysis shows that the Q2 (predictive relevance) value of consumer intention is positive (Q2 = 0.469). This finding shows that the exogenous model structure of this research has good predictive relevance to the endogenous structure.

Figure 2. Path diagram based on loading factor value.



## Discussion

The results of the study indicate that all UTAUT elements (performance expectancy, effort expectancy, social influence and system quality) significantly affect the intention to use mobile banking. This finding strengthens UTAUT. Meanwhile, security and trust have a positive but insignificant effect. In addition, education level only significantly moderates social influence and intention to use mobile banking, while it moderates other variables insignificantly.

Performance expectancy has the most significant impact on consumer intention to use mobile banking. This is in line with research on mobile banking in Bangladesh (Akhter et al., 2020) and internet banking in India (Kaur & Arora, 2021). Performance expectancy is related to how convenience impacts the acceptance of mobile banking technology.

The findings of this study are in line with those of Ningsih and Hamid (2022), Deameta (2019), who found that business expectations influence the intention to use mobile banking. However, this study is not in line with Irsyad et al. (2023), which shows that the tendency of Indonesian consumers to use mobile banking is not influenced by business expectations. The results of the study revealed that social influence has a positive and significant effect on the intention to use mobile banking in Indonesia. Mobile banking is part of the digital economy that is correlated with an increase in the frequency of digital-based economic transactions. The opinion that social influence has a positive and significant effect is supported by the findings of Shia et al. (2015), who found that social influence also has a positive and significant effect on the adoption of e-commerce in Indonesia (Jakarta) and China (Taipei). The findings of Mahadeo (2009) also revealed that social influence affects the community's use of public service information systems implemented by the government (e-Government).

System quality has a positive and significant effect on consumer intentions to use mobile banking. This finding is consistent with the findings of Singu and Chakraborty (2022) but not with those of Ofori et al. (2017) and Jafri et al. (2024).

Consumer intentions to use mobile banking are not significantly influenced by security factors. Several cases of fraud have occurred, which is why not everyone feels that mobile banking is safe and thus makes them less trusting. They are more confident in transacting directly with the bank or via ATM. This result is not in line with the findings of several previous studies (Chiu et al., 2017; Singh & Srivastava, 2018), which stated that security factors influence consumer intentions to use mobile banking. However, research by Chawla & Joshi (2019) is in line with the results of this study. This study found that trust does not affect consumer intentions to use mobile banking, which is not in line with several previous studies (Hasan et al., 2024; Wu, 2023; Jouda, 2020; Silanoi et al., 2023; Jason Lim et al., 2017; Jarad, 2022; Merhi et al., 2019; Abu-Taieh et al., 2022) stating that the level of trust affects intention consumers positively and significantly. Singh and Srivastava (2018) found that the level of trust has a negative but insignificant effect on consumer intention. The results of this study are in line with those of Chawla & Joshi (2019).

Education level can play a significant role as a moderator of social influence on consumer intention. With influence from friends and family, the intention to use will rise; this is moderated by the respondent's level of education. Their knowledge helps rationalise what is obtained from the environment. Indirectly, this emphasises the importance of education in making wise financial decisions after considering social perspectives. However, the findings of this study differ from those of Chen et al. (2020), which highlighted the importance of education as a moderating variable between supportive conditions and performance expectancy with intentions.

The results of this study in Indonesia differ from the study in Malaysia conducted by Jafri et al. (2024). They found that only performance expectancy and social influence had a positive and significant effect on the intention to use mobile banking, while effort expectancy, system quality, trust and perceived security were not significant. The role of education level as a moderating variable between social influence and intention is the same between Indonesia and Malaysia.

## Conclusions

This study integrates the UTAUT model with trust and security and uses education level as a moderating variable. This study determines how performance expectancy, effort expectancy, social influence and system quality affect the intention to use mobile banking. Security factors and trust levels do not have a significant effect. Education level is only able to moderate the relationship between social influence and intention.

This research offers a certain perspective on the background of Indonesian consumers who may differ from consumers in other countries in terms of knowledge, culture, economic status, and level of technological and financial development. Future research is needed to identify potential causes of differences in the impact of demographic parameters. The practical implication is that the government

should create regulations that support digital banking security. In addition, banks need to understand consumer intentions so that financial technology applications can be promoted effectively.

**Acknowledgements:** The authors express their gratitude for the funding provided by Universitas Sumatera Utara under Contract Number 19/UN5.4.10.S/PPM/KP-TALENTA/RB1/2024, dated 31 May 2024.

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