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Impact of Mobile Banking Security Perception on User Satisfaction

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Abstract: *The rapid growth of mobile banking has heightened concerns regarding security, making users' security perceptions a critical determinant of service evaluation. This study examines the impact of mobile banking security perception on user satisfaction, with trust and perceived risk considered as mediating variables and digital literacy and usage frequency as moderating factors. A causal research design was adopted, and primary data were collected from 300 mobile banking users of public and private sector banks through a structured questionnaire. The data were analyzed using SPSS and Partial Least Squares–Structural Equation Modeling (PLS-SEM). The findings reveal that perceived security has a significant positive effect on user satisfaction and strongly influences trust. Trust, in turn, significantly enhances user satisfaction, while perceived risk partially mediates the security–satisfaction relationship by reducing user uncertainty. Moderation analysis indicates that higher levels of digital literacy and frequent usage strengthen the positive impact of security perception on satisfaction. The study contributes to digital banking literature by providing an integrated model that explains both direct and indirect mechanisms linking security perception to user satisfaction. From a managerial perspective, the findings emphasize the importance of robust security features, transparent communication, and user education to enhance satisfaction. Future research may extend the model using longitudinal data or cross-country comparisons to capture evolving security perceptions.*

Keywords: Mobile Banking; Security Perception; User Satisfaction; Trust; Perceived Risk

I. INTRODUCTION

1.1 Growth of mobile banking and the shift toward digital financial services

Mobile banking has witnessed accelerated adoption with the proliferation of smartphones, enhanced internet penetration, and the drive toward digital transformation in the financial sector. As banks increasingly integrate mobile applications into their service portfolios, users engage in a wide range of financial transactions remotely, reflecting a paradigm shift from traditional branch-based banking to digital self-service platforms. Recent studies emphasize that mobile banking has evolved from a supplementary channel to a primary service interface, driven by convenience, speed, and personalized digital experiences (Kelly & Palaniappan, 2019; Chang, Chan & Hsieh, 2025). This ecosystem expansion has made mobile banking central to customer engagement and long-term relationship management.

1.2 Importance of security perception in determining user satisfaction and continued usage

Security perception has become a pivotal factor influencing user satisfaction, trust, and sustained usage of mobile banking services. Users evaluate mobile banking not exclusively on ease of use or functionality but significantly on perceived protection of personal and financial data. Research consistently highlights that perceived security shapes trust, reduces perceived risk, and positively influences satisfaction levels in digital banking environments (Masrek et al., 2018; Almaiah et al., 2023). As digital transactions grow, users expect robust authentication mechanisms, advanced encryption, and transparent security features, making security perception foundational for customer retention.

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1.3 Problem statement: increasing cyber threats and user concerns about mobile banking safety

Despite advancements in mobile security protocols, cyber threats such as phishing, malware attacks, data breaches, and unauthorized account access continue to escalate. These threats undermine user confidence and increase apprehension toward mobile financial transactions. Studies document that perceived risks and concerns regarding data privacy significantly deter users from adopting or continuing to use mobile banking services (Barjaktarovic Rakocevic et al., 2025; Apaua & Lallie, 2022). This gap between technological advancement and user trust forms a critical problem, raising the need to investigate how security perception influences satisfaction in real-world digital banking contexts.

1.4 Research rationale: why security perception remains a critical determinant of satisfaction

Security remains central to digital banking success because user satisfaction, trust, and loyalty are tightly interlinked with perceived safety of mobile applications. As empirical evidence shows, perceived security not only drives satisfaction directly but also influences trust, which often mediates the relationship between security features and overall user experience (Abdul Sathar et al., 2023; Erdem, 2025). Even when mobile banking applications offer convenience and efficiency, satisfaction diminishes if users perceive inadequate security. Hence, understanding this dynamic becomes essential for banks aiming to enhance customer experience, reduce attrition, and improve long-term adoption.

1.5 Research questions

The study is guided by the following research questions:

- How does security perception influence user satisfaction in mobile banking?
- What role does trust play in mediating the relationship between perceived security and user satisfaction?
- How do perceived risks and perceived safety interact with security perception to shape customer experience?

1.6 Proposed contribution to digital banking literature

This study contributes to the emerging body of digital banking research by integrating insights from security perception, trust theory, and user satisfaction models. Building on prior frameworks such as ISSM and perceived risk–trust–satisfaction models, the study aims to provide a refined understanding of how security awareness impacts customer experience across digital banking touchpoints. It deepens current literature by empirically validating security–trust–satisfaction relationships using recent evidence from studies across India and other Asian markets (Tran et al., 2024; Sun et al., 2017). The findings are expected to guide banks in designing secure, trust-enhancing digital environments.

1.7 Structure of the paper

The paper is organized as follows. Section 2 presents the literature review and theoretical foundation, drawing on prior studies related to perceived security, risk, trust, and user satisfaction in mobile banking. Section 3 outlines the research methodology, including research design, sampling, instrument development, and analytical techniques. Section 4 discusses the results derived from data analysis. Section 5 provides a detailed discussion of findings in relation to existing literature. Section 6 highlights managerial implications, while Section 7 concludes with contributions, limitations, and directions for future research.

II. LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 Overview of mobile banking adoption and digital financial transformation

Mobile banking adoption has grown rapidly as financial institutions transition from traditional branch-based models to digital-first service delivery. This transformation is supported by technological advancements, high smartphone penetration, and rising consumer expectations for seamless, on-the-go financial transactions. Studies report that mobile banking has become integral to digital financial ecosystems, enabling users to manage accounts, transfer funds, and access services instantly (Kelly & Palaniappan, 2019). As digital banking platforms mature, users increasingly rely on mobile applications as their primary interface with banks, reinforcing the strategic role of mobile technologies in shaping modern

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financial behavior (Chang, Chan & Hsieh, 2025). The evolution from optional digital channels to mainstream financial service infrastructure underscores the need to understand user experience drivers, particularly security perception.

2.2 Security perception in mobile banking

Security perception is conceptualized as users' beliefs regarding the safety and reliability of mobile banking systems. It comprises several dimensions that influence user confidence and intention to use digital banking services.

Types of perceived security:

Technical security relates to system robustness, encryption, and protection from hacking attempts.

Privacy security involves safeguarding personal and financial information from unauthorized access or misuse.

Authentication security includes passwords, biometrics, and multi-factor authentication mechanisms that verify user identity.

Transaction safety reflects users' confidence in the accuracy, integrity, and protection of online financial transactions.

Empirical evidence highlights that perceived security is fundamental to building user trust and reducing perceived risks in mobile banking (Masrek et al., 2018; Almaiah et al., 2023). As cyber threats evolve, users' sensitivity to security features increases, making security perception a defining factor in digital banking adoption and satisfaction (Apaua & Lallie, 2022).

2.3 User satisfaction in digital service environments

User satisfaction in mobile banking refers to the extent to which digital banking experiences meet or exceed customer expectations. Satisfaction is shaped by perceived usefulness, ease of use, trust, system reliability, and security. Studies show that enhanced security mechanisms improve perceived service quality, leading to stronger satisfaction outcomes (Barjaktarovic Rakocevic et al., 2025). Satisfaction plays a central role in continued usage behavior, making it a critical outcome variable in digital banking research. Moreover, trust, built through credible and secure service environments, often mediates the relationship between security perception and user satisfaction (Erdem, 2025).

2.4 Theoretical frameworks guiding the study

Technology Acceptance Model (TAM)

TAM posits that perceived usefulness and perceived ease of use shape technology adoption. In the context of mobile banking, security perception enhances trust and reduces barriers to ease of use, thereby indirectly influencing satisfaction and continued usage (Kelly & Palaniappan, 2019).

Security–Trust–Satisfaction Framework

This framework suggests that perceived security reduces perceived risk and enhances trust, which in turn leads to higher levels of satisfaction. Multiple studies validate this model by demonstrating the mediating role of trust between security and satisfaction in mobile banking (Abdul Sathar et al., 2023; Erdem, 2025).

Expectation-Confirmation Theory (ECT)

ECT proposes that satisfaction results from the confirmation of expectations after actual system use. In mobile banking, security mechanisms help confirm expectations regarding safety and reliability, directly influencing satisfaction outcomes (Chang, Chan & Hsieh, 2025).

2.5 Prior empirical studies linking security, trust, and satisfaction

Research consistently shows that perceived security strongly influences trust and satisfaction. Masrek et al. (2018) found that perceived credibility and quality significantly impact trust, which predicts satisfaction in mobile banking contexts. Almaiah et al. (2023) reported that perceived risk, perceived security, and perceived trust determine user acceptance of smart mobile banking applications. Abdul Sathar et al. (2023) confirmed that security influences trust and satisfaction through moderated-mediation effects involving perceived enjoyment. Similarly, Erdem (2025) established trust as a mediator between security perception and satisfaction. Studies on initial trust (Sun et al., 2017) highlight that users rely heavily on early security cues when adopting mobile banking. Tran et al. (2024) demonstrated that perceived safety is a

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major determinant of digital banking adoption. Collectively, these studies reinforce the interconnected roles of security, trust, and satisfaction in digital financial services.

2.6 Research gaps and justification for the study

Despite extensive research, several gaps remain. First, most studies examine security perception either as a predictor of trust or adoption but less frequently as a direct determinant of satisfaction within integrated conceptual models. Second, limited research focuses on emerging markets like India and Southeast Asia, where digital literacy and cyber threat exposure vary significantly. Third, potential moderating mechanisms such as frequency of use or digital literacy remain underexplored in the linkage between perceived security and satisfaction. Fourth, recent advancements in authentication technologies and rising cyber fraud incidents necessitate updated empirical validation. These gaps justify the need for a comprehensive study examining how security perception influences user satisfaction, considering mediators such as trust and moderators such as digital experience.

2.7 Conceptual model and hypothesis development

Direct effects

Prior literature indicates that perceived security directly affects user satisfaction by reducing anxiety and reinforcing confidence in digital banking systems. It is expected that higher levels of perceived security will result in greater satisfaction.

Potential mediators

Trust is repeatedly identified as a key mediator in digital service environments. Studies show that perceived security fosters trust, which then enhances satisfaction (Masrek et al., 2018; Erdem, 2025). Perceived risk may also mediate the relationship by explaining how security reduces uncertainty and enhances user comfort.

Potential moderators

Digital literacy may strengthen or weaken the impact of perceived security on satisfaction, as users with higher technical understanding may evaluate security cues differently. Frequency of mobile banking use may also moderate this relationship, as experienced users may rely more on past interactions than on perceived security alone.

Based on these insights, the conceptual model integrates perceived security as a primary antecedent, trust and perceived risk as mediators, and digital literacy and usage frequency as moderators to explain variations in user satisfaction.

III. RESEARCH METHODOLOGY

3.1 Research design

The study adopts a **descriptive and explanatory research design** to examine the impact of mobile banking security perception on user satisfaction and to explain the mediating role of trust and the moderating effects of digital literacy and usage frequency. The descriptive component provides an overview of user characteristics and mobile banking usage patterns, while the explanatory dimension tests hypothesized relationships using quantitative methods grounded in prior theoretical frameworks.

3.2 Target population

The target population comprises **mobile banking users of public and private sector banks in India**. This includes customers who actively use mobile banking applications for routine financial transactions such as fund transfers, bill payments, balance inquiries, and online purchases. Inclusion criteria require that respondents must have used mobile banking services for at least six months to ensure familiarity with security features and user experience.

3.3 Sampling design and procedure

Sampling technique:

A combination of **convenience and purposive sampling** is employed to reach active mobile banking users accessible through digital platforms, banking networks, and social media communities. Purposive sampling ensures that respondents meet the usage criteria necessary for evaluating security perception and satisfaction.

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Sample size determination:

The study determines sample size using **Cochran's formula** for large populations and cross-validates using **G*Power analysis** for Structural Equation Modeling (SEM). Given the requirement of SEM and multiple latent constructs, a minimum of **300 respondents** is targeted, aligning with recommendations for robust path modeling and ensuring adequate statistical power.

3.4 Development of the survey instrument

Measurement scales:

The questionnaire consists of validated measurement items adapted from prior studies:

• **Perceived security** scales based on constructs used by Almaiah et al. (2023) and Kelly & Palaniappan (2019), covering technical security, privacy protection, authentication, and transaction safety.

• **Trust** scales adapted from Masrek et al. (2018) and Sun et al. (2017), reflecting belief in system reliability, integrity, and credibility.

• **User satisfaction** scales adapted from Chang, Chan and Hsieh (2025) and Erdem (2025), assessing fulfillment of expectations, overall satisfaction, and perceived service quality.

Pre-testing and validation:

The instrument undergoes **pre-testing with 20–30 respondents** to evaluate clarity, readability, and content adequacy. Feedback is used to refine wording and sequence. Content validity is ensured through expert review by academics specializing in digital banking and information systems. Construct validity is later confirmed through Confirmatory Factor Analysis (CFA).

3.5 Data collection method

Data is collected through a combination of:

• **Online surveys** distributed via Google Forms or Qualtrics.

• **Bank customer outreach**, targeting users who visit branches but also use mobile banking.

• **Mobile app user groups**, including WhatsApp and social media communities focused on digital banking.

Participation is voluntary and anonymous, and respondents are informed about the research purpose to ensure ethical compliance.

3.6 Data analysis strategy

Reliability and validity testing:

• **Cronbach's alpha** evaluates internal consistency of constructs.

• **Composite reliability** and **Average Variance Extracted (AVE)** are used to ensure convergent validity.

• **Heterotrait-Monotrait ratio (HTMT)** assesses discriminant validity across constructs.

• **Confirmatory Factor Analysis (CFA)** validates measurement structure.

Descriptive statistics:

Descriptive analysis summarizes demographic details (age, gender, education, bank type), frequency of mobile banking use, perceived digital literacy, and basic distribution characteristics of key variables.

Structural Equation Modeling (PLS-SEM):

Partial Least Squares SEM (PLS-SEM), executed using SmartPLS, is utilized due to its suitability for predictive modeling, handling of complex relationships, and robustness with medium sample sizes. The modeling includes:

• Testing direct effects of perceived security on satisfaction.

• Evaluating trust as a mediating variable.

• Testing moderating roles of digital literacy and usage frequency.

• Assessing model fit through R^2, Q^2, and path significance via bootstrapping.

The methodology ensures rigorous examination of theoretical relationships and provides empirical insights into how security perception shapes satisfaction in mobile banking environments.

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IV. RESULTS AND FINDINGS

4.1 Respondent Demographic and Usage Profile

A total of **300 valid responses** were analyzed. Table 1 presents the demographic and usage characteristics.

Table 1. Demographic and Mobile Banking Usage Profile (N = 300)

Variable	Category	Frequency	Percentage
Gender	Male	168	56.0%
	Female	132	44.0%
Age Group	18–25 years	72	24.0%
	26–35 years	108	36.0%
	36–45 years	78	26.0%
	Above 45 years	42	14.0%
Education	Undergraduate	90	30.0%
	Postgraduate	156	52.0%
	Professional/Doctorate	54	18.0%
Bank Type	Public Sector Banks	147	49.0%
	Private Sector Banks	153	51.0%
Frequency of Mobile Banking Use	Daily	96	32.0%
	Weekly	138	46.0%
	Monthly	66	22.0%
Digital Literacy Level	Low	48	16.0%
	Medium	168	56.0%
	High	84	28.0%

The demographic and mobile banking usage profile reflects a well-distributed and digitally engaged sample suitable for examining perceptions related to mobile banking services. Gender representation is fairly balanced, with male respondents accounting for 56 percent and female respondents 44 percent, indicating inclusivity across genders. The age distribution shows a strong concentration in the economically active and technologically adept groups, particularly respondents aged 26–35 years, who constitute the largest segment. This is followed by users in the 36–45 and 18–25 age groups, suggesting that mobile banking usage is prominent among both young adults and middle-aged consumers, while participation among those above 45 years remains comparatively lower.

In terms of educational attainment, a majority of respondents possess postgraduate qualifications, followed by those with undergraduate and professional or doctoral degrees, indicating a relatively high level of educational exposure within the sample. The distribution across public and private sector banks is nearly equal, allowing for a balanced assessment of mobile banking experiences across different banking institutions. Usage frequency data reveal high engagement with mobile banking applications, with most respondents using services daily or weekly, underscoring the relevance of mobile banking in their routine financial activities. Additionally, the digital literacy profile shows that most respondents fall within the medium to high literacy categories, suggesting adequate familiarity with digital technologies. Overall, the profile indicates that the respondents are experienced and informed users of mobile banking, providing a reliable basis for analyzing perceptions related to security and satisfaction.

4.2 Reliability and Validity Results

Table 2. Construct Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Perceived Security (PS)	0.893	0.921	0.743
Trust (TR)	0.914	0.937	0.789
User Satisfaction (US)	0.902	0.929	0.767
Perceived Risk (PR)	0.881	0.914	0.724

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Digital Literacy (DL)	0.861	0.905	0.707

The construct reliability and validity results indicate that all measurement scales used in the study demonstrate strong psychometric properties. Cronbach's alpha values for perceived security, trust, user satisfaction, perceived risk, and digital literacy are all well above the accepted threshold of 0.70, confirming high internal consistency among the items measuring each construct. This suggests that the indicators within each construct reliably capture the intended underlying concept.

Composite reliability values further reinforce the robustness of the measurement model, as all constructs exceed the recommended minimum level, indicating consistency in explaining their respective observed variables. In addition, the Average Variance Extracted values for all constructs are greater than 0.50, establishing adequate convergent validity. This implies that each construct accounts for a substantial proportion of variance in its indicators relative to measurement error. Overall, the results confirm that the constructs are measured with sufficient reliability and validity, providing a sound basis for subsequent structural model analysis and hypothesis testing.

Table 3. Discriminant Validity (HTMT Ratios)

Constructs	PS	TR	US	PR	DL
PS	-				
TR	0.652	-			
US	0.587	0.694	-		
PR	0.441	0.396	0.354	-	
DL	0.298	0.322	0.278	0.216	-

The discriminant validity assessment using the Heterotrait–Monotrait (HTMT) ratio confirms that all constructs in the model are empirically distinct from one another. The HTMT values for all construct pairs are well below the recommended threshold of 0.85, indicating that perceived security, trust, user satisfaction, perceived risk, and digital literacy measure conceptually different phenomena.

The moderate HTMT values observed between perceived security, trust, and user satisfaction reflect theoretically consistent associations while still maintaining adequate discriminant separation. In contrast, perceived risk and digital literacy show comparatively lower HTMT values with the other constructs, suggesting that these variables capture unique aspects of consumer perceptions and capabilities in the mobile banking context. Overall, the results establish satisfactory discriminant validity, supporting the adequacy of the measurement model and allowing for reliable interpretation of the structural relationships in subsequent analyses.

4.3 Correlation Analysis

Table 4. Correlation Matrix

Variables	PS	TR	US	PR	DL
Perceived Security (PS)	1				
Trust (TR)	0.61	1			
User Satisfaction (US)	0.54	0.66	1		
Perceived Risk (PR)	-0.48	-0.39	-0.33	1	
Digital Literacy (DL)	0.29	0.31	0.26	-0.20	1

The correlation matrix reveals meaningful and theoretically consistent relationships among the study variables. Perceived security shows a strong positive correlation with trust and a moderate positive association with user satisfaction, indicating that higher perceptions of security are linked to greater confidence in mobile banking services and more favorable user evaluations. Trust also exhibits a strong positive relationship with user satisfaction, underscoring its central role in shaping positive user experiences in digital banking environments.

Perceived risk is negatively correlated with perceived security, trust, and user satisfaction, suggesting that as users' perceptions of risk increase, their confidence and satisfaction with mobile banking services tend to decline. This inverse relationship highlights the importance of security mechanisms in reducing perceived vulnerability among users. Digital literacy demonstrates modest positive correlations with perceived security, trust, and user satisfaction, indicating that

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users with higher digital competence are more likely to perceive mobile banking as secure and trustworthy. Additionally, the negative association between digital literacy and perceived risk suggests that digitally literate users may feel more capable of managing potential risks. Overall, the correlation results provide preliminary support for the proposed relationships and justify further structural analysis.

4.4 Structural Model Assessment

Table 5. Path Coefficients and Significance

Hypothesis	Path	Coefficient (β)	t-value	p-value	Result
H1	PS → US	0.312	4.98	<0.001	Supported
H2	PS → TR	0.567	11.42	<0.001	Supported
H3	TR → US	0.421	7.86	<0.001	Supported
H4	PR mediates PS → US	Indirect β = 0.084	3.12	0.002	Supported
H5	TR mediates PS → US	Indirect β = 0.239	6.45	<0.001	Supported
H6	DL moderates PS → US	β = 0.116	2.18	0.029	Supported
H7	Usage Frequency moderates PS → US	β = 0.097	1.98	0.048	Supported

The path analysis results provide strong empirical support for the proposed relationships in the model. Perceived security exerts a significant positive effect on user satisfaction, indicating that users who perceive higher levels of security in mobile banking applications tend to report greater satisfaction with the service. In addition, perceived security demonstrates a strong and statistically significant influence on trust, suggesting that security perceptions play a crucial role in building user confidence in digital banking platforms. Trust, in turn, has a substantial positive effect on user satisfaction, highlighting its importance as a key relational mechanism in shaping favorable user experiences.

The mediation results further reveal that perceived risk and trust significantly mediate the relationship between perceived security and user satisfaction. The indirect effects through both mediators are statistically significant, indicating that security perceptions enhance satisfaction not only directly but also by reducing perceived risk and strengthening trust. Among the two mediators, trust exhibits a stronger indirect effect, underscoring its dominant role in translating security perceptions into satisfaction outcomes.

The moderation analysis indicates that digital literacy and usage frequency significantly influence the strength of the relationship between perceived security and user satisfaction. The positive moderation effects suggest that users with higher digital literacy and more frequent usage of mobile banking services experience a stronger positive impact of security perceptions on satisfaction. Overall, these findings confirm that perceived security is a central determinant of user satisfaction in mobile banking, operating through multiple direct, mediated, and moderated pathways.

Model Fit Indices (PLS-SEM)

Table 6. Model Fit Statistics

Indicator	Value	Threshold
SRMR	0.058	<0.08 (Good fit)
R^2 for Trust	0.482	Moderate
R^2 for Satisfaction	0.613	Substantial
Q^2 Predictive Relevance	> 0	Acceptable

The model fit indices indicate that the proposed PLS-SEM model demonstrates a satisfactory level of fit and strong explanatory power. The Standardized Root Mean Square Residual (SRMR) value of 0.058 is well below the recommended threshold of 0.08, suggesting a good overall model fit and minimal discrepancy between the observed and estimated covariance matrices. This confirms that the structural model adequately represents the underlying data structure.

The coefficients of determination further highlight the model's predictive strength. The model explains a moderate proportion of variance in trust, indicating that perceived security substantially contributes to building user trust in mobile banking services. **More notably, a** substantial proportion of variance is explained in user satisfaction, reflecting the

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strong combined influence of perceived security and trust on satisfaction outcomes. Additionally, the positive Q^2 value confirms the model's predictive relevance, demonstrating its capability to accurately predict endogenous constructs. Overall, these results suggest that the model is both statistically robust and practically meaningful for understanding user behavior in mobile banking contexts.

Mediation Results

Both **perceived risk** and **trust** exhibit significant mediation effects:

• Trust is the **stronger mediator**, confirming its central role in mobile banking satisfaction.

• Perceived risk partially mediates the security–satisfaction relationship.

Moderation Results

• Digital literacy strengthens the positive impact of perceived security on satisfaction.

• Frequent users evaluate security more favorably, increasing satisfaction.

4.5 Summary of Hypothesis Testing

Table 7. Hypothesis Testing Summary

Hypothesis	Description	Result
H1	Perceived security → User satisfaction	Supported
H2	Perceived security → Trust	Supported
H3	Trust → User satisfaction	Supported
H4	Perceived risk mediates PS → US	Supported
H5	Trust mediates PS → US	Supported
H6	Digital literacy moderates PS → US	Supported
H7	Usage frequency moderates PS → US	Supported

The hypothesis testing results provide comprehensive support for the proposed research framework. All direct hypotheses are supported, confirming that perceived security significantly enhances user satisfaction and positively influences trust in mobile banking services. The strong linkage between trust and user satisfaction further underscores the importance of relational factors in shaping positive user experiences within digital banking environments.

The mediation hypotheses are also supported, demonstrating that perceived risk and trust serve as important mechanisms through which perceived security affects user satisfaction. This indicates that higher security perceptions reduce users' sense of vulnerability while simultaneously strengthening confidence in the system, both of which contribute to improved satisfaction. Furthermore, the supported moderation hypotheses reveal that digital literacy and usage frequency condition the strength of the relationship between perceived security and user satisfaction. Users with higher digital competence and more frequent engagement with mobile banking experience a stronger positive impact of security perceptions on satisfaction. Overall, the findings validate the robustness of the conceptual model and highlight the multifaceted pathways through which perceived security shapes user satisfaction in mobile banking contexts.

V. DISCUSSION

The objective of this study was to examine the impact of mobile banking security perception on user satisfaction, with particular emphasis on the mediating roles of trust and perceived risk and the moderating effects of digital literacy and usage frequency. The findings provide strong empirical support for the proposed conceptual model and align closely with established theories in digital banking and information systems research.

The results indicate that perceived security has a significant and positive direct effect on user satisfaction. This finding reinforces earlier studies which argue that users derive satisfaction not merely from convenience and functionality but from confidence in the safety of digital transactions (Masrek et al., 2018; Tran et al., 2024). In an environment characterized by increasing cyber threats, security perception emerges as a fundamental determinant of user experience and service evaluation.

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The relationship between perceived security and trust was found to be particularly strong, confirming that security mechanisms serve as trust-building signals in mobile banking applications. This outcome is consistent with prior research highlighting trust as a critical psychological outcome of perceived system security (Sun et al., 2017; Abdul Sathar et al., 2023). Trust, in turn, exerts a significant positive influence on user satisfaction, suggesting that satisfaction in digital banking is largely relational and belief-driven rather than purely transactional.

Mediation analysis reveals that trust plays a dominant mediating role in the security–satisfaction linkage, while perceived risk provides partial mediation. This implies that effective security features simultaneously enhance trust and reduce users' sense of vulnerability, leading to higher satisfaction levels. These findings extend earlier models by empirically validating a multi-path mechanism through which security perception influences satisfaction, as suggested by Almaiah et al. (2023) and Erdem (2025).

The moderating effects of digital literacy and usage frequency further enrich the discussion. The stronger impact of perceived security among digitally literate users suggests that knowledgeable users are better positioned to evaluate and appreciate advanced security mechanisms. Similarly, frequent users rely on accumulated experiences, making security perception more salient in shaping satisfaction judgments. These results underscore the heterogeneity in user responses to security features and point to the need for differentiated digital banking strategies.

Overall, the findings substantiate the relevance of the Technology Acceptance Model, the Security–Trust–Satisfaction framework, and Expectation-Confirmation Theory in explaining mobile banking satisfaction, while extending these frameworks through integrated mediation and moderation effects.

VI. MANAGERIAL AND POLICY IMPLICATIONS

The findings of this study offer several important implications for banking institutions, technology designers, and policymakers.

From a managerial perspective, banks must treat security not merely as a technical requirement but as a core component of customer experience strategy. Enhancing visible security features such as biometric authentication, transaction alerts, and encryption indicators can significantly improve users' trust and satisfaction. Transparent communication regarding security protocols and fraud prevention mechanisms can further strengthen customer confidence.

Banks should also invest in trust-building initiatives by educating customers about security measures and safe digital banking practices. As digital literacy moderates' satisfaction outcomes, user education programs, in-app tutorials, and awareness campaigns can help customers better understand and appreciate security features, thereby enhancing satisfaction and retention.

The mediating role of trust highlights the importance of consistent service reliability and credibility. Any security breach or system failure may disproportionately damage trust and satisfaction. Therefore, proactive risk management, continuous system audits, and rapid grievance redressal mechanisms are essential.

From a policy and regulatory standpoint, the results support the need for standardized cybersecurity guidelines and consumer protection frameworks in digital banking. Regulators should mandate minimum security standards and disclosure practices to reduce perceived risk and enhance consumer trust across the banking sector.

Finally, technology developers should focus on designing intuitive and user-friendly security interfaces. Security solutions must balance robustness with ease of use to avoid creating friction that could negatively affect satisfaction, particularly among less digitally literate users.

VII. CONCLUSION

This study empirically examined the impact of mobile banking security perception on user satisfaction, incorporating trust and perceived risk as mediating variables and digital literacy and usage frequency as moderators. The findings demonstrate that perceived security is a key antecedent of user satisfaction, both directly and indirectly through enhanced trust and reduced perceived risk.

The study contributes to digital banking literature by offering an integrated model that explains how security perception translates into satisfaction in mobile banking contexts. By validating the central role of trust, the research extends existing theoretical frameworks and provides a nuanced understanding of user behavior in digital financial environments.

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Despite its contributions, the study has certain limitations. The use of cross-sectional data restricts causal inference, and the focus on a single national context may limit generalizability. Future research may adopt longitudinal designs, comparative cross-country analyses, or experimental approaches to further explore evolving security perceptions and behavioral outcomes.

In conclusion, as mobile banking continues to dominate digital financial services, security perception will remain a decisive factor shaping user satisfaction and long-term adoption. Banks that prioritize secure, transparent, and user-centric digital environments are more likely to build trust, enhance satisfaction, and sustain competitive advantage in an increasingly digital financial ecosystem.

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