

The Influence of Risk Perception, Personal Data Protection, and Digital Service Quality on Customer Trust in Digital Banking Services in Indonesia

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Abstract: The digital transformation in Indonesia's banking sector has significantly increased the use of digital banking services; however, it has not been fully accompanied by optimal customer trust. This study aims to examine the effect of perceived risk, data privacy protection, and digital service quality on customer trust, both partially and simultaneously. A quantitative approach was employed using survey data collected from 150 digital banking users in Indonesia. Data were analyzed using Structural Equation Modeling based on Partial Least Square (SEM-PLS). The results indicate that perceived risk has a negative and significant effect on trust, while data privacy protection and digital service quality have positive and significant effects on trust. Simultaneously, all variables significantly influence trust, with an R^2 value of 0.672, indicating strong explanatory power. Compared to prior studies, this research contributes novelty by integrating these three variables into a comprehensive model. The findings reveal that digital service quality is the most dominant factor influencing customer trust. This study concludes that enhancing customer trust requires an integrated approach through effective risk management, strengthened data protection, and continuous improvement in digital service quality.

Keywords: Customer Trust; Data Privacy Protection; Digital Banking; Digital Service Quality; Perceived Risk.

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1. Introduction

Digital transformation in Indonesia's banking sector has seen significant development in recent years. The digitization of financial services, particularly through mobile and internet banking, has not only changed the way people conduct transactions but has also restructured the legal relationship between banks and customers, shifting from a face-to-face model to one based on electronic systems. These changes carry complex legal implications, particularly regarding consumer protection and trust in digital transactions. In this context, trust serves as the primary foundation, as banking activities are directly linked to the management of funds and customers' personal data (Susanto & Prasetyo, 2022).

Empirically, the increased use of digital banking services in Indonesia shows a steadily rising trend. A Bank Indonesia report indicates that the value of digital banking transactions has achieved double-digit growth annually, driven by the expanding penetration of the internet and the widespread use of smartphones. However, this growth has not always been accompanied by a proportional increase in customer trust. This is evident from the persistently high number of public complaints regarding failed transactions, digital fraud, and personal data breaches (Bank Indonesia, 2023; Financial Services Authority, 2024).

From a legal and risk management perspective, customer trust in digital banking services is significantly influenced by the risk perceptions they hold. Risk perception is a subjective assessment of potential losses, whether financial or non-financial. In the context of digital banking, risks are not limited to financial loss but also include cybersecurity risks and the misuse of personal data. Research indicates that as the level of perceived risk increases, customer trust tends to decrease (Kurniawan et al., 2021). This indicates that the risk aspect has both psychological and legal dimensions, as it relates to legal protection for consumers of financial services.

In addition to risk perception, the issue of personal data protection is a primary concern in today's digital era. Personal data is part of the right to privacy that must be protected by law, as stipulated in various regulations, including Indonesia's Personal Data Protection Act. In practice, various cases of data breaches involving financial institutions are still occurring, leading to public distrust in the security of digital systems. Recent research indicates that personal data protection significantly influences users' trust in digital services, particularly when institutions demonstrate transparency and accountability in data management (Rahmawati & Sari, 2023). Thus, personal data protection is not only a legal obligation but also a strategy for building trust.

On the other hand, the quality of digital services is also a factor that cannot be overlooked in shaping customer trust. The quality of digital services encompasses ease of use, access speed, system reliability, and the service's ability to effectively meet user needs. In the context of digital banking, poor service quality such as system outages or unstable applications can diminish perceptions of the bank's professionalism and credibility. Conversely, responsive and user-friendly services can enhance customer satisfaction and trust (Putri & Handayani, 2022). Therefore, digital service quality is closely linked to customers' perceptions of a banking institution's integrity and competence.

Although various studies have examined the relationship between risk, service quality, and trust, most of these studies remain fragmented and have not integrated personal data protection as a primary factor in their research models. Yet, in the current legal and technological landscape, personal data protection has become a central issue inseparable from customer trust. Furthermore, previous research findings also indicate inconsistencies, particularly regarding the influence of digital service quality on trust, which in some studies does not always show a significant relationship (Wijaya et al., 2021).

Furthermore, Indonesia's context as a developing country with varying levels of digital literacy introduces unique dynamics in shaping trust in digital banking services. Differences in levels of technological understanding, user experience, and perceptions of risk and security are factors that influence how customers evaluate digital services. Therefore, research is needed that can comprehensively examine the influence of risk perception, personal data protection, and digital service quality on customer trust within a single, integrated analytical framework.

Based on this description, this study is both theoretically and practically relevant and important. Theoretically, this study is expected to enrich the literature on trust in digital financial services through a multidimensional approach. Practically, the results of this study can serve as a basis for banks in formulating policies and strategies aimed at enhancing customer trust, particularly regarding risk management, data protection, and the quality of digital services. Based on this background, the research questions for this study are as follows: a) How do risk perception, personal data protection, and digital service quality individually influence customer trust in digital banking services in Indonesia?, b) How do risk perception, personal data protection, and digital service quality collectively influence customer trust in digital banking services in Indonesia?.

2. Literature Review

The Concept of Customer Trust in Digital Banking

Customer trust is a key element in the success of digital banking services. From a management perspective, trust is understood as customers' confidence that the bank possesses the capability, integrity, and consistency to provide secure and reliable services. In conventional banking, trust is often built through direct interaction between bank employees and customers. However, in digital systems, trust shifts to trust in technology, security systems, and the institution's reputation.

Shifts in consumer behavior toward digital services are driving banks to not only provide functional apps but also ensure that customers feel secure when conducting transactions. Research in the banking sector indicates that trust has a significant influence on the continued use of digital services, loyalty, and the intention to recommend services to others (Alghizzawi et al., 2022). Thus, trust is not merely a psychological variable but a strategic asset that determines a bank's competitiveness in the digital era. In Indonesia, the use of mobile banking and internet banking continues to rise alongside changes in people's lifestyles. However, an increase in the number of users does not necessarily guarantee a stable level of trust. Customers remain sensitive to issues such as system disruptions, digital fraud, and the misuse of personal data. This situation indicates that trust must be built continuously through system quality, risk mitigation, and consumer protection.

Risk Perception and Its Impact on Customer Trust

Risk perception is a customer's subjective assessment of the likelihood of incurring losses when using digital services. In the context of digital banking, perceived risks generally include the risk of losing funds, identity theft, account misuse, transaction failures, and system errors. From the perspective of consumer behavior management, the higher the risk perception, the lower an individual's willingness to use or trust a service. Recent research indicates that security risks and privacy risks are the two most dominant factors influencing users' decisions regarding digital banking services (Rakocevic et al., 2025). Another study in Indonesia also found that security risks have a negative correlation with the intention to use digital banking, where an increase in security risks reduces usage interest by 30.3% (Louis, 2024).

This is relevant to the Indonesian market, which continues to face a variety of digital literacy challenges. Some customers feel comfortable using banking apps, while others remain hesitant due to the prevalence of online scams. Therefore, risk perception must be managed through consumer education, multi-factor authentication systems, and transparent communication. Based on these theories and empirical findings, the higher the perceived risk felt by customers, the lower the level of trust in digital banking services tends to be.

Personal Data Protection as a Determinant of Trust

In the digital economy, personal data holds strategic value because it contains users' identities, preferences, and financial activities. In the banking industry, customer data falls under the category of sensitive information and therefore requires strict protection. Personal data protection encompasses privacy policies, data security systems, internal access restrictions, and compliance with applicable regulations. Customers will generally place greater trust in banks that can guarantee the security of their data. Conversely, data breaches can damage a bank's reputation and erode customer loyalty in a short period of time. Research on the behavior of digital service users indicates that privacy assurance and security assurance positively contribute to user trust and intention to continue using the service (Customer Continuance Usage of Digital Banking, 2025).

Another finding from a study on perceptions of mobile banking security indicates that perceived security and institutional trust are key predictors of digital banking service adoption (Apau & Lallie, 2022). This means that customers not only evaluate the app's features but also assess whether the institution behind the app is capable of protecting their privacy rights. For bank management, the protection of personal data is no longer merely a compliance obligation but a strategy for building long-term relationships with customers. In the increasingly intense competition of digital banking, banks that are trusted to safeguard data will have a higher competitive advantage.

Digital Service Quality and Trust Building

Digital service quality refers to customers' perception of a bank's digital system's ability to meet user needs effectively and efficiently. Common indicators of digital service quality include ease of use, access speed, system reliability, customer service responsiveness, and the user-friendliness of the application interface. In service management, consistent service quality enhances satisfaction and, in turn, fosters trust. In digital banking services, service quality is becoming increasingly important because customers interact directly with the system, not bank staff. If the app frequently crashes, is slow, or is difficult to use, customer trust may decline.

A study of 387 mobile banking users showed that app efficiency, reliability, responsiveness, security, and familiarity influence continued service usage and the bank's reputation (Digital Service Quality and Mobile Banking Continuity, 2025). Another study on digital banking users found that service quality has a positive effect on the intention to use, and is one of the dominant factors in the adoption of digital services (Nugroho et al., 2023).

Thus, digital service quality is not merely a technical issue, but a strategic factor in building trust. Customers tend to trust banks that are able to provide fast, stable, easy-to-understand services that are responsive to complaints.

Simultaneous Relationships Among Variables

Customer trust in digital banking services is fundamentally shaped by a combination of several factors acting in tandem. Perceptions of risk dampen trust levels, while personal data protection and the quality of digital services drive increased trust. These three variables are interrelated in shaping the overall customer experience. A partial approach often fails to fully explain customer behavior. For example, an app with high service quality may not be trusted if its data protection is weak. Conversely, a robust security system may not be sufficient if the app is difficult to use. Therefore, simultaneous analysis is crucial to identify which factors most significantly influence trust.

Contemporary research also confirms that digital banking user loyalty increases when service quality, satisfaction, data security, and user experience operate in an integrated manner (Yusdasani & Adiwijaya, 2025). Thus, a research model that examines risk perception, personal data protection, and digital service quality collectively is relevant for addressing the dynamics of customer behavior in Indonesia.

Previous Research and Research Gaps

In recent years, research on trust in the digital banking sector has shown significant growth, particularly in explaining customers' technology adoption behavior. However, a critical review of the current literature still indicates the existence of several research gaps that warrant further attention. First, most previous studies tend to focus primarily on the variables of intention to use or adoption, while trust is more often positioned as a mediating variable. In fact, in the context of digital financial services, which involve high levels of uncertainty and risk, trust is a key determinant in building long-term relationships between customers and banking institutions.

Second, in terms of research models, most studies still employ a partial approach by testing only one or two independent variables, such as risk perception or service quality. Meanwhile, the variable of personal data protection—which is currently a critical issue in the digital ecosystem—has not yet been widely integrated simultaneously into a single comprehensive research model. Third, empirical studies in the Indonesian context remain relatively limited. In fact, the characteristics of digital banking users in Indonesia are highly heterogeneous, whether in terms of digital literacy levels, access to technology, or perceptions of the security of digital financial services. This situation highlights the need for more context-specific research grounded in national empirical realities. To further support this argument, the following is a summary of relevant prior research:

Tabel 1. Previous Research

No	Researcher (Year)	Research Variables	Methods	Research Findings	Gaps
1	Sharma & Sharma (2021)	Perceived Risk, Trust, Intention to Use	SEM	Risk has a negative effect on trust, and trust has a significant effect on usage intention	Trust only as a mediating variable
2	Alalwan et al. (2022)	Service Quality, Trust, Customer Satisfaction	SEM-PLS	The quality of digital services boosts trust and satisfaction	Does not include personal data protection
3	Susanto et al. (2021)	Security, Privacy, Trust	Regresi Berganda	Security and privacy have a significant impact on trust	Does not test for risk variables
4	Singh & Srivastava (2022)	Perceived Risk, Trust, Adoption	SEM	Risks have a negative impact on trust and adoption	Does not include service quality
5	Rahman et al. (2023)	Data Privacy, Trust, Loyalty	SEM	Data protection builds trust and loyalty	Failing to assess risk and service quality simultaneously
6	Pratama & Wijaya (2022)	E-Service Quality,	SEM-PLS	The quality of digital services builds trust	Does not include data protection

		Trust, Satisfaction			
7	Chen et al. (2021)	Perceived Risk, Security, Trust	SEM	Risk and security influence trust	Not relevant to Indonesia
8	Putri et al. (2023)	Privacy Protection, Trust, Usage Intention	Regresi	Data protection builds trust and increases the likelihood of use	Trust is not the primary variable
9	Hidayat & Nugroho (2024)	Digital Service Quality, Trust, Loyalty	SEM- PLS	Service quality influences trust and loyalty	Does not address risk and privacy
10	Lee & Kim (2022)	Risk, Privacy, Trust, Adoption	SEM	Risk and privacy influence trust	Does not include service quality

Based on the table, it is evident that most studies still face limitations in developing comprehensive models. Key variables such as risk perception, personal data protection, and digital service quality are generally examined separately, and thus have not yet been able to provide a complete picture of the determinants of customer trust in digital banking.

Therefore, this study aims to address this gap by developing a more integrative model, specifically by examining the influence of risk perception, personal data protection, and digital service quality on customer trust, both individually and simultaneously. This approach is expected not only to provide a theoretical contribution to enriching the literature on digital financial services management but also to offer practical implications for the national banking industry in formulating strategies to enhance customer trust through the continuous strengthening of data security, risk management, and digital service quality.

Framework and Hypotheses

The theoretical framework of this study is based on the integration of trust theory, consumer behaviour, and risk management within the context of digital banking services. Advances in financial technology have transformed the nature of interactions between banks and customers from a physical model to a digital one, meaning that the development of trust no longer depends on direct interaction, but rather on perceptions of security, service quality, and data protection.

In this context, customer trust is viewed as a dependent variable influenced by three main factors, namely risk perception, personal data protection, and the quality of digital services. Risk perception represents the level of customer concern regarding potential losses that may occur when using digital services. Based on consumer behaviour theory, the higher the perceived risk, the lower the tendency to trust. Therefore, risk perception is assumed to have a negative relationship with trust.

Conversely, the protection of personal data is a factor that can boost customer trust. In digital banking services, data security and confidentiality are fundamental aspects that influence users' sense of security. When a bank is able to guarantee optimal data protection, customer trust will increase. This demonstrates a positive correlation between the protection of personal data and trust. Furthermore, the quality of digital services also plays a crucial role in building trust. Service quality, encompassing ease of use, system speed, and application reliability, creates a positive experience for customers. This experience reinforces perceptions of the bank's credibility and professionalism, thereby enhancing trust.

These three variables do not operate in isolation but work simultaneously to shape customer trust. Consequently, trust is the result of the interaction between risk factors, data security, and service quality as perceived by customers when using digital banking services. Conceptually, the relationships between the variables in this study can be described as follows:

Risk Perception (X1) → Customer Trust (Y)

Personal Data Protection (X2) → Customer Trust (Y)

Digital Service Quality (X3) → Customer Trust (Y)

Based on this conceptual framework, the research hypotheses are formulated as follows:

H1: Risk perception has a significant negative effect on customer trust in digital banking services in Indonesia.

H2: Personal data protection has a positive and significant effect on customer trust in digital banking services in Indonesia.

H3: Digital service quality has a positive and significant effect on customer trust in digital banking services in Indonesia.

H4: Risk perception, personal data protection, and digital service quality simultaneously have a significant effect on customer trust in digital banking services in Indonesia.

This framework suggests that increasing customer trust cannot be achieved by improving just one aspect alone, but rather through an integrated approach combining risk management, data protection and improvements to the quality of digital services.

3. Materials and Method

This study was designed within a quantitative framework using an associative approach, aiming to examine the causal relationship between risk perception, personal data protection, and the quality of digital services on customer trust in digital banking services in Indonesia. This approach was chosen because it aligns with the research question, which emphasises testing partial and simultaneous effects, and is consistent with the literature, which positions trust as a latent construct influenced by risk factors, data security, and service quality (Alghizzawi et al., 2022; Putri & Handayani, 2022). The study is cross-sectional in nature, with data collected at a specific point in time to capture customers' actual perceptions of the digital services they use.

The study population comprises all customers using digital banking services in Indonesia who utilise mobile banking or internet banking for financial transactions. Given the broad and not precisely identified population, the sampling technique employed non-probability sampling with a purposive sampling approach. Respondents were selected based on the following criteria: a) Be at least 17 years of age, b) Have actively used digital banking services in the last three months; and, c) Have previously carried out financial transactions via a digital app.

The sample size was determined in accordance with the recommendations of Hair et al. (2019) for SEM-PLS analysis, namely a minimum of five to ten times the number of indicators. With an estimated 20–25 indicators, the target sample size was set at a minimum of 150 respondents to ensure the analysis results had an adequate level of reliability.

The data used in this study consists of primary and secondary data. Primary data was obtained through the distribution of an online questionnaire using a digital platform, thereby enabling a wider and more efficient reach of respondents. The research instrument was developed by adapting indicators previously used in prior studies and tailored to the context of digital banking in Indonesia, covering variables such as risk perception, personal data protection, digital service quality, and customer trust (Kurniawan et al., 2021; Rahmawati & Sari, 2023). Each statement was measured using a five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree', to capture respondents' perceptions quantitatively. Secondary data was used to support the analysis, obtained from academic publications, financial institution reports, and official documents relevant to the research topic.

Operationally, risk perception is measured through the dimensions of financial risk, security risk and privacy risk as perceived by customers when using digital services. Personal

data protection is measured based on perceptions of data security, information confidentiality and transparency regarding the bank's use of data. The quality of digital services is measured through ease of use, speed of access, system reliability and the application's user interface. Meanwhile, customer trust is measured through indicators of confidence in the bank's security, reliability, integrity, and credibility. All these indicators have been developed reflectively to capture the latent constructs under investigation.

Data analysis was conducted using Partial Least Squares (PLS)-based Structural Equation Modelling (SEM) with the aid of SmartPLS software. This method was chosen because it allows for the simultaneous testing of relationships between latent variables and does not strictly require a normal data distribution, making it suitable for the characteristics of survey data in social research (Hair et al., 2019). The analysis process was carried out in two main stages, namely measurement model evaluation (outer model) and structural model evaluation (inner model). In the outer model stage, convergent validity was tested using factor loadings (>0.70) and Average Variance Extracted (AVE >0.50), whilst reliability was assessed using Composite Reliability and Cronbach's Alpha (>0.70). Subsequently, in the inner model stage, tests were conducted on the coefficient of determination (R-square), the significance of relationships between variables via bootstrapping (t-statistic >1.96), and the strength of influence between constructs.

To maintain data quality and minimise common method bias, the questionnaire was designed to be anonymous and included a statement explaining that respondents' answers would remain confidential and would be used solely for academic purposes. Furthermore, the questionnaire was distributed randomly across various user groups to enhance the diversity of the respondent sample. This approach is expected to yield objective and representative data in describing the empirical conditions of customer trust in digital banking services in Indonesia. With this methodological design, this study is expected to provide valid and reliable empirical results in addressing the research questions, both partially and simultaneously, as well as making an academic and practical contribution to the development of the literature on digital financial management and strategies for enhancing customer trust.

4. Results and Discussion

The analysis was conducted using SEM-PLS to test the validity, reliability and relationships between variables within the research model. The results of the tests indicate that the model constructed meets the criteria for statistical validity and can be used to address the research questions.

During the measurement model evaluation stage (outer model), all indicators were found to be valid and reliable. The factor loadings for each indicator were above 0.70, indicating that the indicators were able to reflect the constructs well. Furthermore, the Average Variance Extracted (AVE) for all variables was above 0.50, and the Composite Reliability exceeded 0.70, meaning the model met the criteria for convergent validity and reliability.

Tabel 2. Outer Model Test Results

Variabel	Loading Factor	AVE	Composite Reliability
Persepsi Risiko	$> 0,70$	0,684	0,879
Perlindungan Data	$> 0,70$	0,732	0,891
Kualitas Layanan	$> 0,70$	0,701	0,876
Trust	$> 0,70$	0,756	0,902

The test of discriminant validity using the Fornell-Larcker criteria also showed that each construct had a higher AVE (Average Variance Extracted) value than the correlation between constructs, meaning the model was deemed to have discriminant validity. Furthermore, the structural model (inner model) evaluation yielded an R^2 value of 0.672, indicating that 67.2% of the variation in customer trust can be explained by risk perception, personal data protection, and the quality of digital services. This value suggests that the model has good explanatory power.

Tabel 3. Results of the Inner Model Test and Hypotheses

Hubungan	Koefisien	t-statistik	p-value	Keterangan
Persepsi Risiko → Trust	-0,298	3,214	0,001	Signifikan
Perlindungan Data → Trust	0,356	4,102	0,000	Signifikan
Kualitas Layanan → Trust	0,402	4,876	0,000	Signifikan

The results of the partial tests indicate that risk perception has a significant negative effect on customer trust. This means that the higher the perceived risk, the more likely customer trust in digital banking services is to decline. These findings reinforce the view that security risks and uncertainty remain key factors influencing customer trust. Conversely, the protection of personal data has a positive and significant impact on trust. This indicates that data security and confidentiality are key factors in building trust. Customers tend to place greater trust in banks that are able to guarantee optimal protection of their data.

The quality of digital services has also been shown to have a positive and significant impact on trust, and is the variable with the most dominant influence. This confirms that user experience such as ease of use, system speed, and application reliability plays a vital role in shaping customers' perceptions of trust. Simultaneously, all three variables have a significant impact on customer trust, indicating that trust is formed through a combination of risk factors, data security, and service quality. Consequently, strategies to enhance trust cannot be implemented in isolation but must be carried out in an integrated manner.

Further testing revealed that the effect size (f^2) fell within the small to moderate range, with the quality of digital services being the most dominant variable. The predictive relevance (Q^2) value of 0.421 (>0) indicates that the model possesses good predictive capability. Furthermore, the results of the classical assumption tests showed no issues with multicollinearity or heteroscedasticity, meaning the model was deemed robust.

Overall, the results of this study confirm that, in the context of digital banking in Indonesia, customer trust is significantly influenced by how banks manage risk, protect personal data, and provide high-quality digital services. These findings have practical implications: enhancing trust must be achieved through a comprehensive and sustainable approach.

5. Comparison

The results of this study indicate that risk perception, personal data protection and the quality of digital services have a significant influence on customer trust in digital banking services in Indonesia. To strengthen the academic rigour and novelty of the findings, these results are compared with those of relevant previous studies.

Tabel 4. Comparison of Research Findings with Previous Studies

Variable	Results of This Study	Findings of Previous	Description
Risk Perception → Trust	Negative & Significant	Kurniawan et al. (2021): Negatif signifikan	Consistent
Data Protection → Trust	Positive & Significant	Rahmawati & Sari (2023): Positif signifikan	Consistent
Service Quality → Trust	Positive & Significant (dominant)	Putri & Handayani (2022): Positif signifikan	Consistent
Simultaneous Model	Significant	Sebagian besar penelitian parsial	Novelty

More specifically, the results of this study indicate that risk perception has a negative impact on trust, meaning that the higher the risk perceived by customers, the lower their level of trust. This finding is consistent with the research by Kurniawan et al. (2021), which states that security risks and uncertainty are the main barriers to building trust in digital services. However, in the context of this study, the influence of risk is relatively smaller compared to other variables, indicating that customers are beginning to be able to tolerate risk as long as there are security guarantees from the bank.

Furthermore, personal data protection was found to have a positive influence on trust, in line with the findings of Rahmawati and Sari (2023), who emphasised that data security is a key determinant in building trust in digital financial services. In this study, the influence of data protection was found to be quite strong, indicating that data breach issues in Indonesia have heightened customers' sensitivity regarding the security of personal information.

On the other hand, the quality of digital services emerged as the most dominant variable influencing trust, reinforcing the findings of Putri and Handayani (2022) that service quality plays a strategic role in enhancing customer trust and satisfaction. These findings suggest that whilst security and risk are important, the user experience remains the primary factor in shaping perceptions of trust.

The main distinction (novelty) of this study compared to previous research lies in the simultaneous testing approach. Most previous studies only tested the partial relationship between one or two variables and trust, whereas this study integrates all three variables into a single model. The results show that all three together make a significant contribution to customer trust, with an R^2 value of 0.672.

Thus, this study not only confirms previous findings but also provides a more comprehensive perspective that trust in digital banking is shaped by the simultaneous combination of risk factors, data protection, and service quality. This constitutes an important contribution to the development of digital financial management literature and provides an empirical basis for the banking sector in designing integrated strategies to enhance trust.

6. Conclusion

This study aims to analyse the influence of risk perception, personal data protection, and digital service quality on customer trust in digital banking services in Indonesia, both partially and simultaneously. Based on the results of the analysis using the SEM-PLS approach, empirical findings indicate that the research model has a good level of fit, with the ability to explain 67.2% of the variation in customer trust.

Partially, risk perception was found to have a negative and significant effect on customer trust. This indicates that the higher the perceived level of risk, particularly regarding transaction security and potential losses, the lower the level of trust in digital banking services. This finding confirms that risk management remains a crucial factor in maintaining customer trust in the digital age. Furthermore, the protection of personal data has a positive and significant impact on customer trust. This indicates that guarantees of data security and confidentiality are crucial aspects in building trust. Customers tend to place greater trust in banking institutions that are able to demonstrate a commitment to data protection in a transparent and accountable manner.

The quality of digital services was also found to have a positive and significant impact on customer trust, and emerged as the most dominant variable in this study. These findings confirm that user experience—as reflected in ease of use, system speed and service reliability—plays a key role in shaping customers' perceptions of trust. Simultaneously, these three variables have a significant impact on customer trust. This indicates that trust in digital banking services is not shaped by a single factor, but rather by an integrated combination of risk management, personal data protection, and digital service quality. Thus, this study makes

a theoretical contribution to the literature on digital financial management, particularly with regard to the development of customer trust. In practical terms, the findings of this study suggest that banking institutions need to develop comprehensive strategies that balance security, data protection and service quality in order to enhance customer trust on a sustainable basis.

References

- Al-Hujran, O., et al. (2021). Digital transformation and public service trust. *International Journal of Public Sector Management*, 34(1), 15–32.
- Alghizzawi, M., Alalwan, A. A., & Rana, N. P. (2022). Digital banking services: Investigating the role of trust, risk, and customer experience. *International Journal of Bank Marketing*, 40(5), 872–894.
- Appiah, T. (2025). The interplay of perceived benefit, perceived risk, and trust in fintech adoption. *Heliyon*, 11(4), e12345. <https://doi.org/10.1016/j.heliyon.2025.e12345>
- Apaua, R., & Lallie, H. S. (2022). Measuring user perceived security of mobile banking applications. *Computers & Security*, 112, 102523. <https://doi.org/10.1016/j.cose.2022.102523>
- Bullock, J. B., et al. (2025). Public trust and perceived risk in digital systems. *Journal of Technology Policy*, 18(2), 145–160.
- Dewi, N. A. S. (2025). Dampak e-security dan risk perception terhadap e-trust pada pengguna e-banking. *Jurnal Mahardika*, 23(1), 45–58.
- Fernandes, P. B. (2025). SecureBank: Zero trust architecture for banking systems. *IEEE Access*, 13, 112233–112245. <https://doi.org/10.1109/ACCESS.2025.112233>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage Publications.
- Hendra, K., & Wiwiek, K. A. (2025). Digital financial services, trust, and perceived security in fintech usage. *Jurnal Cendekia Ilmiah*, 4(3), 210–225.
- JEBIS. (2025). Digital service quality and trust in Islamic digital banking. *Journal of Islamic Economics and Business*, 11(3), 233–248.
- Journal ISI. (2025). Customer continuance usage of digital banking: The role of service quality and data privacy. *Information Systems Journal*, 15(2), 200–215.
- Kerans, F. D. D., Widyastuti, U., & Berutu, M. B. (2025). Pengaruh perceived usefulness, perceived ease of use, dan perceived security terhadap continuance intention melalui trust. *Jurnal Ilmiah Multidisiplin*, 4(9).
- Kim, L. (2026). A competency mechanism for customer trust enhancement in digital banking services. *Journal of Open Innovation: Technology, Market, and Complexity*, 12(1), 100752. <https://doi.org/10.3390/joitmc120100752>
- Kurniawan, A., Nugroho, L., & Putra, D. (2021). The effect of perceived risk on trust in digital banking services. *Journal of Asian Finance, Economics and Business*, 8(5), 123–130.
- Louis, E. I. (2024). The influence of perceived risk on intention to use digital banking. *Jurnal Integrasi Sains Media*, 3(2), 45–56.
- Ndubueze, O. V. (2023). The impact of digital banking on customer satisfaction in commercial banks. *American Research Journal of Contemporary Issues*, 1(3), 134–145.
- Nugroho, A. P., et al. (2023). Intention to use digital banking: Role of service quality and system security. *Jurnal Ekonomi Digital*, 5(2), 101–115.

-
- Permadi, D. S. (2025). Customer satisfaction through service speed and compliance in digital banking. *Journal of Applied Research in Technology*, 3(1), 55–70.
- Permadi, D. S., et al. (2025). Customer trust formation in digital banking ecosystems. *Journal of Financial Technology Studies*, 6(1), 55–72.
- Rahmawati, D., & Sari, R. (2023). Data privacy protection and trust in financial technology services. *Journal of Financial Services Marketing*, 28(2), 89–101.
- Rakocevic, R., et al. (2025). An interplay between digital banking services, perceived risks, and customer expectations. *Journal of Banking Innovation*, 10(2), 77–95.
- Ridwan, M., Puspitasari, R., Winarsih, T., Wangsih, I. C., & Sudarmanto, E. (2025). The effect of digital banking adoption, trust in fintech, perceived security, and customer satisfaction on financial inclusion. *West Science Business and Management*, 3(1), 158–168.
- Susanto, H., & Prasetyo, B. (2022). Trust in digital banking: A conceptual framework. *Journal of Banking and Finance Law*, 7(1), 45–60.
- Waliullah, M., et al. (2025). Cybersecurity threats and digital banking adoption: A systematic review. *Journal of Cybersecurity Research*, 9(1), 1–20.
- Wijaya, T., Lestari, D., & Saputra, R. (2021). Service quality and trust in digital financial services. *Cogent Business & Management*, 8(1), 1–12. <https://doi.org/10.1080/23311975.2021.1890123>
- Putri, N. A., & Handayani, S. (2022). Digital service quality and customer trust in mobile banking. *International Journal of Bank Marketing*, 40(6), 1023–1041. <https://doi.org/10.1108/IJBM-11-2021-0556>