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CUSTOMER LOYALTY IN DIGITAL BANKING: AN INTEGRATED MODEL OF UX, SECURITY, TRUST, AND SATISFACTION

Aditya Ramadhan[1]*, Dian Masyita[2], Elisa Susanti[3]
[1,2,3]Sekolah Pascasarjana Universitas Padjajaran, Bandung, Indonesia
E-mail: adityardss@gmail.com

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Abstract

This study examines the integrated influence of User Experience (UX), Digital Security, and Trust on Customer Satisfaction and Customer Loyalty within the BYOND BSI mobile banking application, a digital upgrade from the previous Mobile BSI system. Using a quantitative approach and SEM-PLS analysis on 400 respondents, the findings reveal that UX and Digital Security significantly enhance Trust and Satisfaction, which then strongly drive Customer Loyalty. Although BYOND BSI demonstrates adequate performance in usability and security, the results highlight several critical issues users still encounter, including application efficiency, authentication delays, accessibility challenges, and inconsistent customer support responsiveness. Trust also emerges as an essential psychological mediator linking users' digital experiences with their loyalty intentions. The model fit results confirm strong predictive accuracy, indicating that the integrated model effectively explains loyalty formation in digital banking. Overall, this study provides empirical evidence that continuous improvements in performance stability, adaptive security, reliability, and service support are required to strengthen long-term customer commitment in the era of digital banking transformation.

Keywords: ***Customer Loyalty, Digital Security, Mobile Banking, Trust, User Experience***

INTRODUCTION

The development of digital transformation in the financial services sector has brought fundamental changes to the way people conduct banking activities. Technological advances, particularly using smartphones and high-speed internet, have driven a shift from conventional banking services to faster, more practical, and more accessible mobile banking. Mobile banking is now the spearhead of digital banking innovation, enabling customers to conduct various transactions anytime and anywhere, while offering a more personalized, secure, and efficient service experience (Andani & Hidayat, 2022; Garzaro et al., 2021). This transformation not only improves the quality of service, but also changes customer expectations regarding the speed, security, and ease of use of digital banking applications (Singh & Sayeed, 2024; Susanto et al., 2023). This transformation encourages banks to provide efficient, secure mobile banking services that deliver an optimal user experience. One concrete example of the digital transformation of Islamic banking in Indonesia is the evolution of Bank Syariah Indonesia's (BSI) mobile banking service, previously known as Mobile BSI, and now developed into the BYOND BSI application. This change marks BSI's strategic move to improve the quality of its digital services through enhanced features, increased security, and a more modern and responsive user experience, thus meeting customer needs in the increasingly competitive digital banking era.

The BYOND by BSI application is a digital service innovation that seeks to address these needs by providing fast, easy, and modern technology-based Sharia-compliant financial transaction features. In this context, customer loyalty is a strategic factor in ensuring the sustainability of digital banking services, especially amidst increasingly fierce competition among digital financial service providers (Ayinaddis et al., 2023; Hussein et al., 2023). The digital transformation undertaken by Bank Syariah Indonesia (BSI) through the development of its mobile banking application from Mobile BSI to BYOND BSI is a strategic effort to improve the quality of digital services that are safer, faster, and more user-friendly. However, this transition is not without various challenges experienced by users. Several issues have emerged, such as less-than-optimal accessibility in various network conditions, an authentication process that is still considered inefficient, and application stability that occasionally experiences disruptions. In addition, some users also feel that the user experience for certain features is still less intuitive, and customer support

services are not fully responsive. These conditions indicate that although BYOND BSI was designed as an improvement on the previous application, there is still a gap between user expectations and application performance. Therefore, it is necessary to examine more deeply how user experience, digital security, trust, and satisfaction influence customer loyalty in using BSI digital banking services. Although BYOND BSI is an improvement on the previous application, Mobile BSI, various field findings indicate that several challenges still affect user experience and loyalty. One issue that emerged was the application's suboptimal efficiency and performance, as evidenced by complaints related to access speed, time-consuming authentication processes, and technical disruptions under certain network conditions. This condition aligns with the findings (Hamza Abbas et al., 2024) which confirms that usability, speed, and interface consistency are key determinants of perceived digital service quality. When the interaction flow is inefficient, user perceptions of service credibility decline, thereby weakening trust in digital banking applications.

Furthermore, users also felt that the accessibility and context of use of BYOND BSI still needed improvement, especially in conditions of limited devices or networks. This supports the research (Gokah et al., 2025) which states that adaptive UX and AI-based interface design can increase trust through a stable and responsive service experience. Applications that fail to adapt to varying network conditions will create user friction, ultimately impacting satisfaction and loyalty. The use of Artificial Intelligence (AI) in mobile banking applications is a crucial element in improving the quality of digital services, particularly regarding security, efficiency, and user experience. In modern applications like BYOND BSI, various forms of AI are used to strengthen security mechanisms, ranging from machine learning-based biometric authentication and fraud detection through transaction pattern analysis to risk-based authentication that analyzes user behavior in real time. This aligns with findings (Gokah et al., 2025) which explains that AI-driven UX frameworks can increase user trust through adaptive security systems that can identify anomalies more precisely without disrupting smooth transactions. Furthermore, AI features such as content personalization and application performance optimization help speed up information access, reduce user cognitive load, and create a comfortable digital interaction experience, as explained by (Hamza Abbas et al., 2024), that usability and system response speed have a direct influence on the formation of user satisfaction and trust in digital banking services.

However, AI integration also raises challenges related to user perceptions of security and convenience. Overly sensitive AI-based authentication processes can generate false alarms, slow down transactions, and create friction that degrades the user experience. Thus, while the implementation of AI in the BYOND BSI application provides added value in improving security, efficiency, and UX quality, the success of this technology depends heavily on how AI is able to balance security, convenience, and reliability to truly strengthen user trust, satisfaction, and loyalty as explained in the digital banking loyalty model by (Hussein et al., 2023). Although BYOND BSI is considered to have a robust digital security system using two-factor authentication (OTP), data encryption, and transaction protection based on modern security algorithms, research results show that some users still feel concerns regarding the consistency of the application's security, especially after system updates or when technical disruptions occur. Some users reported experiences such as OTP delays, frequently interrupted login sessions, and uncertainty about the stability of data protection when the application is experiencing lag or system maintenance. This condition indicates a gap between technical security design and user perception of security (perceived security). These findings are in line with research (Su et al., 2021) which emphasizes that digital security depends not only on technical features, but also on how users perceive the stability, reliability, and transparency of security systems in their daily activities. When users experience even minor obstacles, risk perceptions increase and can reduce trust in digital banking services.

In addition, perceptions of digital security in BYOND BSI are also influenced by other aspects such as system reliability and continuity of protection (Ayinaddis et al., 2023; Hossain et al., 2025) research shows that inconsistent system security, delayed authentication processes, or failed threat detection can reduce user trust and satisfaction. The study also found that digital security has a direct and significant relationship with trust and customer satisfaction, so even minor disruptions in protection mechanisms can significantly impact user loyalty. In the context of BYOND BSI, some users felt that the system did not fully guarantee real-time security, especially when network access was unstable. This concern aligns with research (Mamadiyarov & Karshiev, 2024) which emphasizes that the reliability of digital security and the system's ability to detect threats quickly are key factors in building a sense of security for users. Therefore, although BYOND BSI has implemented high digital security standards, challenges related to consistency, system stability, and security perception remain important issues that need to be strengthened to sustainably increase user trust and loyalty. Research (Hussein et al., 2023; Su et al., 2021)shows that perceived security has a direct impact on trust and customer satisfaction. When users perceive a potential risk to a security system, no matter how small, trust levels can decrease, even if the security functions are technically adequate.

Problems related to the level of user trust in the BYOND BSI application began to emerge when some customers felt inconsistencies in the digital services presented by the application, particularly in aspects of system reliability and service credibility, which are the main foundations in building trust in digital banking services. Trust issues in the BYOND BSI application arose from several aspects related to user perceptions of the reliability, reputation, and consistency of digital services provided by the bank. One of the user trust factors is corporate reputation and reliability regarding doubts about the stability of the BYOND BSI system, especially when the application experiences errors, transaction disruptions, or sudden maintenance. Situations such as these reduce the perception that the application is always truly reliable. This finding is in line with research (Raudhina & Siregar, 2022) which states that trust in digital banking is formed by the consistent interaction of positive experiences, information clarity, and system reliability. When performance inconsistencies occur, even on a small scale, perceived risk increases and user trust is weakened.

Furthermore, trust issues are also related to user perceptions of digital security and institutional credibility. Although BYOND BSI has implemented a modern security system, some users still feel uncertain about the protection of their personal data and the security of their transactions, especially when the app shows signs of instability or slow response. From a user experience (UX) perspective, research (Gokah et al., 2025; Hamza Abbas et al., 2024) which emphasizes that an intuitive interface, stable application performance, and a smooth user experience are quality signals that directly shape user trust. In the context of BYOND BSI, reports of lag, unresponsive displays, or slow loading times reduce user confidence in the system's reliability. Furthermore, customer support is also a factor that undermines user trust in the app. Some users feel that the support service is unresponsive and doesn't provide prompt resolution to issues. Research (Indriastuti & Hidayat, 2021) emphasized that responsiveness and empathy in service significantly determine the level of trust and loyalty of digital banking users. Delays in handling issues or inconsistent information from the bank can raise doubts about the professionalism and credibility of the digital service. Therefore, trust issues in BYOND BSI are not only caused by technical factors, but also by emotional factors and user perceptions, all of which align with the trust-building model in digital banking as described in previous studies.

Meanwhile, in terms of customer support & problem solving, consumers perceive that the effectiveness of BYOND BSI's support services is still not optimal. Research Meanwhile, in terms of customer support & problem solving, consumers perceive that the effectiveness of BYOND BSI's support services is still not optimal. Research (Indriastuti & Hidayat, 2021) explained that response speed and empathy in digital services significantly impact customer satisfaction and loyalty. When users encounter technical issues but don't receive a quick and resolute response, their perception of service quality declines, hindering the formation of emotional commitment, which is crucial for long-term loyalty. These issues highlight that while BYOND BSI has improved BSI's digital banking services, there remains a gap between customer expectations and the app's actual performance. The purpose of this study is to comprehensively examine how User Experience (UX), Digital Security, and Trust shape Customer Satisfaction and contribute to Customer Loyalty in the context of digital banking, specifically in the BYOND BSI application as a development of Mobile BSI. Through an integrated model approach, the research results are directed to uncover critical areas that still need to be improved such as application performance efficiency, accessibility, service reliability, and customer support to strengthen customer loyalty sustainably in the era of digital banking transformation.

LITERATURE REVIEW

User Experience (UX) dalam Digital Banking

User Experience (UX) is a key factor in the successful adoption and retention of digital banking services. In the context of BYOND BSI, UX is needed to ensure that the application provides ease, convenience, efficiency, perceived security, and a positive emotional experience to users. Previous research provides an important foundation for understanding relevant UX dimensions and how UX influences other variables such as trust, satisfaction, and loyalty. Research by (Nafiz et al., 2025) identified four key UX needs in digital banking applications: comfort, efficiency, navigability, and perceived security, which refers to the user's perception of security while interacting with the application. These findings emphasize that UX is not only related to visual design aspects, but also how the application reduces the user's cognitive load and facilitates the transaction process. The strength of this study is its focus on the experience of users with low digital literacy, which is relevant to some BSI customer segments. However, its weakness is that it does not consider advanced UX dimensions such as feature innovation or cross-device consistency.

(Sudirjo et al., 2024) research expanded the scope of UX with six dimensions of the User Experience Questionnaire (UEQ) including attractiveness, perspicacity, efficiency, dependability, stimulation, and novelty, reflecting UX needs in terms of aesthetics, ease of understanding the display, speed, system reliability, and application innovation. This shows that good UX must meet user needs comprehensively, not only in functional aspects but also emotional and cognitive aspects to create user engagement. However, the UEQ focuses more on subjective evaluations and has not yet linked it to psychological outcomes such as trust.

Research (Hamza Abbas et al., 2024), conducted through Cross-Platform Usability Measurement (CPUM), found that UX consistency across devices including visual consistency, navigational smoothness, feature equality, and system responsiveness is a crucial requirement in modern digital banking. This consistency is necessary because many users access banking services through various devices (smartphones, mobile web, and desktop). The advantage of CPUM is that it provides a cross-platform usability perspective, but its drawback is that it does not examine its impact on trust and satisfaction. In the Indonesian context, (Raudhina & Siregar, 2022) emphasize that good UX not only meets functional needs but also fulfills users' emotional needs through visual appeal, system reliability, digital service quality, and emotional engagement. This indicates that users need applications that are not only easy to use but also able to build engagement and trust through user-friendly design and high reliability.

Overall, previous research indicates that UX requirements in digital banking include the application's ability to provide convenience and efficiency through fast and minimally tedious transaction processes (Nafiz et al., 2025; Sudirjo et al., 2024), supported by clear and simple navigation so users can easily find features (Nafiz et al., 2025). Furthermore, interface and performance consistency are crucial because users expect a uniform and stable experience across devices (Hamza Abbas et al., 2024). UX must also demonstrate system reliability through minimal errors, fast response, and application stability to strengthen user trust (Sudirjo et al., 2024). Other equally important aspects are aesthetics and visual appeal, which contribute to user emotional comfort (Raudhina & Siregar, 2022), as well as perceived security, which emphasizes that a sense of security is an integral part of the user experience (Nafiz et al., 2025). Finally, good UX needs to offer innovation and stimulation, so that the digital experience feels fresh, not monotonous, and is able to increase user engagement (Sudirjo et al., 2024).

Digital Security in Banking Services

Digital security is a fundamental element in digital banking services because it forms the basis for building user trust and comfort in conducting online financial transactions. Research by (Hossain et al., 2025; Su et al., 2021) shows that digital security has a significant impact on trust and customer satisfaction, as it provides assurance that customers' personal data and transactions are protected from the risk of misuse. These findings confirm that a robust security system serves not only as technical protection but also as psychological reassurance, helping reduce user anxiety when transacting in a digital environment. In line with this, (Ayinaddis et al., 2023) stated that quality e-banking services, including data protection, information encryption, and multi-layered authentication, have been shown to increase customer satisfaction and loyalty, making security an integral part of the overall digital service experience.

Furthermore, research by (Mamadiyarov & Karshiev, 2024; Paul & Ifatimehin, 2024) emphasizes the importance of robust cybersecurity infrastructure to maintain the integrity, confidentiality, and availability of information in digital banking systems. They show that security system instability or a lack of threat detection can undermine user trust in banks. This is reinforced by (Paul & Ifatimehin, 2024), who found that failure to manage digital security risks directly impacts public trust in online banking services. Digital security aspects also include multi-factor authentication mechanisms, fraud detection systems, and real-time transaction protection designed to prevent unauthorized access and digital-based criminal activity. These three aspects are essential in modern digital banking applications, as users expect security that is not only robust but also consistent and does not hinder user experience.

In the context of UX, the success of digital security is largely determined by how users perceive it. The concept of perceived security is a crucial component that bridges the relationship between security technology and trust. Research by (Nafiz et al., 2025; Susanto et al., 2023), shows that even though security features are technically robust, if users experience system instability, authentication delays, or transaction disruptions, perceptions of security can decline, impacting levels of trust and satisfaction. In other words, effective digital security is not just about implementing technology, but also about how the technology provides a consistent, fast sense of security that does not reduce the comfort of using the application. Overall, previous research shows that the need for digital security in banking includes several important aspects: (1) data protection and privacy, to maintain the confidentiality of user information; (2) multi-factor authentication, to ensure that only authorized users can access accounts; (3) early threat

detection and fraud prevention, which work automatically to identify suspicious behavior; (4) security stability and consistency, so that users feel safe in various network and system conditions; and (5) perceived security, which ensures that users truly feel secure while interacting with the application. These findings provide an important foundation for this research to understand how digital security affects trust and satisfaction, and ultimately forms loyalty in digital banking services such as BYOND BSI.

Trust in Digital Banking

Trust is the primary foundation for using digital banking services, as all user transactions depend on the belief that the system can provide security, reliability, and transparency in every interaction. In the context of digital banking, trust is formed through three main aspects: system reliability, consistent digital security assurance, and corporate reputation. Research by (Su et al., 2021) confirms that trust reflects users' belief that banks can provide secure, stable, and reliable digital services in every transaction. Previous research (Raudhina & Siregar, 2022) found that trust acts as a strong mediator between digital service quality and customer loyalty in Islamic banking, indicating that users assess trustworthiness not only from technical aspects such as security, but also from emotional aspects such as Sharia values and the integrity of the bank's institution. This is reinforced by research by (Hossain et al., 2025), who explained that reliable digital security systems—including encryption, layered authentication, and fraud protection—directly increase user trust in digital banking applications. Similarly, research by (Martínez-Navalón et al., 2023) demonstrated that privacy protection and transparent security policies have a significant influence on forming long-term trust.

From a UX perspective, research by (Gokah et al., 2025; Hamza Abbas et al., 2024) emphasizes that a positive user experience, such as ease of navigation, fast responses, and a consistent appearance, is an important stimulus for building trust. Good UX signals quality to users that the bank has adequate technological capabilities, cares about customer convenience, and can provide stable services. Conversely, application instability, errors, or repeated failed authentication processes can significantly reduce trust, even if the security features are technically robust. Conceptually, trust in digital banking is shaped by several key aspects that reflect user confidence in the capabilities, reliability, and integrity of the digital banking system. Furthermore, Competence is reflected in the perception that the bank has strong technological and operational capabilities to provide secure, fast, and professional digital services a point emphasized by (Su et al., 2021) through the dimensions of structure assurance and perceived quality in building trust. Trust is also influenced by Integrity, namely the belief that the institution acts honestly, transparently, and consistently in maintaining the confidentiality of personal data and adhering to digital service ethics; this aspect is explained by (Sumariani, 2025), who emphasizes the importance of integrity and transparency in increasing customer security. The next aspect is Benevolence, which is the perception that the bank has good intentions and shows concern for customer needs.

Finally, Perceived Security is a crucial factor in building trust because it reflects the extent to which users believe the application provides strong protection for their data and transactions. (Su et al., 2021; Susanto et al., 2023) showed that perceived security aspects such as encryption, biometric authentication, and clear security indicators increase the sense of security without sacrificing the convenience of using the application. Thus, understanding trust in digital banking focuses not only on technical aspects such as system security and reliability, but also encompasses psychological and emotional dimensions formed through institutional competence, integrity, benevolence, and user perceptions of security. The integration of all these aspects is a crucial foundation for the success of digital banking services, including BYOND by BSI, as strong trust has been shown to play a key role in driving user satisfaction and loyalty. The findings and concepts from previous research provide an important foundation for this study to analyze how trust works within an integrated model that connects UX, digital security, satisfaction, and customer loyalty in the era of digital banking service transformation.

Customer Satisfaction in Digital Banking

Customer satisfaction in digital banking is a user's overall assessment of their experience using a digital banking application, including ease of transaction, processing speed, security, and consistency of system performance. (Ayinaddis et al., 2023) emphasized that the quality of electronic services including transaction speed, accuracy, and ease of use is a significant factor in shaping customer satisfaction. In the context of modern digital banking, users evaluate applications not only in terms of basic functionality but also in terms of smoothness, lack of technical obstacles, and the convenience provided during each transaction process. This suggests that satisfaction is formed through a combination of technical aspects and emotional perceptions of the application experience.

Previous research has shown that user experience (UX) has a strong influence on satisfaction levels in digital services. (Susanto et al., 2023) found that ease of navigation, intuitive interface structure, and system responsiveness directly contribute to customer satisfaction. Users tend to feel satisfied when an application can be operated quickly, is error-free, and has an easy-to-understand interface. This finding is consistent with the research of (Nafiz et al., 2025) which stated that convenience, efficiency, and ease of navigation shape perceptions of satisfaction while creating positive experiences that increase loyalty. Thus, UX plays a key role in building a comprehensive experience that influences users' emotional evaluations of digital banking applications. In addition to UX, digital security is also a crucial determinant of user satisfaction. Security is considered a key prerequisite for digital banking users, given that transactions involve sensitive and high-value information. (Hossain et al., 2025; Su et al., 2021) emphasized that perceived security through data protection, multi-layered authentication, and transaction encryption enhance users' sense of security and convenience, thus influencing their satisfaction levels. When users believe an application can protect their data and transactions, they are more likely to feel satisfied and willing to use the service continuously. In other words, satisfaction stems not only from application performance but also from the sense of security provided by the digital security system.

In the context of Islamic banking, research by (Raudhina & Siregar, 2022) revealed that satisfaction and trust simultaneously mediate the relationship between service quality and customer loyalty in Islamic digital banking. This suggests that satisfaction is not merely a response to application functionality but also reflects users' moral and emotional evaluations of the service's compliance with Islamic principles, transparency, and the institution's reliability. Research by (Indriastuti & Hidayat, 2021) also confirms that satisfaction is formed through positive user experiences with the performance and responsibility of financial institutions and is a key determinant of digital banking customer loyalty. Thus, customer satisfaction in digital banking services is the result of a complex combination of the quality of the user experience, perceived security, system reliability, and the effectiveness of the bank's service support. Consistent findings from previous research indicate that satisfaction not only serves as an indicator of digital service success but also as a mediator connecting UX, digital security, and trust with user loyalty. Therefore, a deep understanding of the factors' shaping satisfaction is crucial in designing digital banking application development strategies, including BYOND BSI, to create experiences that not only meet user expectations but also encourage long-term commitment and loyalty.

Customer Loyalty in the Digital Banking Era

Customer loyalty in the digital banking era is no longer simply understood as a customer's tendency to continue using a banking service, but also encompasses emotional commitment, willingness to recommend an application, resistance to switching to another service, and intention to make repeat transactions. Research by (Raudhina & Siregar, 2022; Su et al., 2021) states that customer loyalty is formed through a safe, convenient, and reliable digital experience, where satisfaction and trust act as a link between digital service quality and customer loyalty behavior. These findings confirm that loyalty in the digital context is not formed directly from technological features alone, but through users' psychological evaluation of the system's stability, convenience, and security. Another relevant study in the context of Islamic banking was conducted by (Raudhina & Siregar, 2022), which showed that trust and customer satisfaction simultaneously influence customer loyalty in Islamic digital banking applications. They found that users tend to demonstrate long-term loyalty when the application not only provides easy transactions but also reflects the institution's ethical values, integrity, and transparency. This aligns with the findings of (Indriastuti & Hidayat, 2021), who stated that a positive user experience through quick responses, clear information, and quality digital services—contributes directly to users' intention to continue using the application and recommend it to others. Thus, user loyalty is shaped by a combination of technical, emotional, and trust-based aspects.

In addition to trust and satisfaction, previous research also highlights that a modern user experience (UX) based on convenience, efficiency, and stability plays a crucial role in driving digital banking user loyalty. (Gokah et al., 2025; Hamza Abbas et al., 2024) emphasized that an intuitive and responsive UX increases perceived value and trust, thereby strengthening users' commitment to repeat use of the service. This finding is further supported by research by (Susanto et al., 2023), which shows that the speed and ease of digital transactions are key factors in building loyalty because they provide the functional convenience highly valued by users in the digital era. These findings emphasize that in the competitive digital banking landscape, user experience and perceived service value are key drivers of loyalty. Thus, customer loyalty in the digital banking era is the result of a combination of positive user experiences, reliable digital security, strong trust, and consistent levels of satisfaction. Previous research clearly shows that loyalty is not formed solely by technological features, but also by how the technology is able to create

value, convenience, and a sense of security for users. The findings in this thesis further confirm that BYOND BSI user loyalty can still be strengthened by improving reliability, service support, and strengthening the perception of reputation and trust in the application. Therefore, a deep understanding of the factors that shape loyalty is crucial to encourage the development of more competitive, inclusive, and sustainable digital banking services in the future.

Integrated Model: UX, Digital Security, Trust, Satisfaction, and Loyalty

An integrated model linking User Experience (UX), Digital Security, Trust, Customer Satisfaction, and Customer Loyalty have become a major focus in various digital banking studies. Numerous studies show that these five variables do not operate in isolation but influence each other in a causal chain that shapes the behavior and loyalty of mobile banking app users. (Susanto et al., 2023) emphasized that UX and perceived security are the initial factors that determine how customers evaluate the quality of an app, which then influences trust and satisfaction as psychological outcomes before ultimately forming loyalty. In the context of mobile banking apps like BYOND BSI, which rely on all-digital features without physical interaction, this integrative model is highly relevant because all customer experience processes are influenced by the digital design they encounter every day.

Various previous studies have consistently shown that UX and digital security act as key antecedents in building trust and satisfaction. (Gokah et al., 2025; Hamza Abbas et al., 2024) explain that intuitive, efficient, and responsive UX creates a perception of system competence and minimizes users' cognitive load, ultimately increasing trust levels. Meanwhile, research by (Hossain et al., 2025; Su et al., 2021) found that strong digital security including encryption, multi-factor authentication, and fraud detection significantly increases users' perceived security, which in turn strengthens trust. This means that both UX and security are the initial foundations of mobile banking applications, as they are the first things customers evaluate when opening and using applications like BYOND BSI.

Furthermore, previous research confirms that trust and satisfaction act as dual mediators in the relationship between UX/security and customer loyalty. (Raudhina & Siregar, 2022) stated that in Islamic digital banking, these two mediators are crucial because customers assess the institution's morality, service clarity, and application stability in making loyalty decisions. (Indriastuti & Hidayat, 2021) also stated that satisfaction is formed when an application can meet user expectations regarding digital performance, while trust is formed from perceptions of the service provider's competence and integrity. Thus, loyalty is built not only from technical experience but also from the sense of security and psychological trust that is developed during interactions with the application.

The integration of these five variables is evident in various empirical models, which show that UX and security indirectly influence loyalty through trust and satisfaction. (Ayinaddis et al., 2023) study positions satisfaction as the primary mediator, while Purwanto et al.'s (2020) emphasizes trust as the central mediator. (Raudhina & Siregar, 2022) study found that both need to be included as multiple mediators for the model to more accurately explain the behavior of Islamic digital banking users. This difference suggests that the integrative model is not universal but is heavily influenced by the service context, application format, and user characteristics.

Thus, an integrated model linking UX, digital security, trust, and customer satisfaction to loyalty provides a comprehensive understanding of how user experiences and perceptions are shaped within the mobile banking ecosystem. Previous studies have shown that these five variables are strongly interrelated and inseparable in explaining digital banking user behavior. In the context of BYOND BSI, these findings provide an important foundation for developing strategies to improve digital service quality, as improvements in a single variable such as UX or security will have a direct or indirect impact on trust, satisfaction, and ultimately loyalty. Therefore, this integrative model not only provides a theoretical contribution to digital banking studies but also offers practical direction for BSI in strengthening the competitiveness and sustainability of mobile banking services in the era of digital transformation.

METHOD

Research Design

This study uses a quantitative approach with an explanatory research method that aims to analyze the causal relationship between variables, namely User Experience (UX), Digital Security, Trust, Customer Satisfaction, and Customer Loyalty in the context of using the BYOND BSI mobile banking application. This approach was chosen because it can explain the direct and indirect influences between variables through structural modeling. This study is also cross-sectional, meaning that data was collected at a specific point in time as a representation of the perceptions of BYOND BSI users after the transition from the BSI Mobile application.

Research Population and Sample

The study population comprised all active users of the BYOND BSI app in Indonesia. Given the large number of users spread across the country, this study employed a non-probability sampling technique with a purposive sampling approach, selecting respondents based on specific criteria. The sample criteria used in this study included: 1) Active users of the BYOND BSI app, 2) Having used the app more than three times in the past month, and 3) Being at least 17 years old and using official banking services. Based on the sampling formula for SEM-PLS analysis, the minimum sample size is calculated from the most frequently used indicators. This study collected 400 respondents, meeting the minimum requirement (10x the number of indicators). This number was deemed sufficient to produce a stable and reliable structural model.

Data Collection Technique

Primary data was obtained through an online questionnaire using Google Forms. The research instrument was developed based on indicators validated in previous research and adapted to the context of BYOND BSI. The measurement scale used was a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was distributed through social media, BSI user communities, and academic networks. Secondary data was obtained from official BSI reports, scientific articles, international journals related to digital banking, and literature supporting the development of the research model.

Operationalization of Research Variables

In this study, the research variables consist of five main constructs:

Table 1. Operational Variables

Varaible	Dimensions	Refrence
User Experience (UX)	Measured using the dimensions: ease, efficiency, clarity of navigation, aesthetics, learnability, and accessibility.	(Nafiz et al., 2025; Sudirjo et al., 2024)
Digital Security	Measured based on perceived security, data protection, authentication, and risk detection.	(Hossain et al., 2025; Su et al., 2021)
Trust	Measured through reliability, integrity, benevolence, competence, and perceived security.	(Raudhina & Siregar, 2022; Sumariani, 2025)
Customer Satisfaction	Includes service quality, perceived value, and overall evaluation of the experience of using the application.	(Ayinaddis et al., 2023; Susanto et al., 2023)
Customer Loyalty	Measured through repurchase intention, resistance to switching, word of mouth, emotional commitment, and cross-buying.	(Indriastuti & Hidayat, 2021; Su et al., 2021)

Data Analysis Techniques

The data analysis technique in this study used the Structural Equation Modeling–Partial Least Squares (SEM-PLS) approach with the assistance of SmartPLS 4 software. The SEM-PLS method was chosen because of its ability to analyze complex models with numerous latent constructs, indicators, and direct and indirect causal relationships between variables. Furthermore, SEM-PLS is suitable for predictive-oriented research, does not require strict normal distribution assumptions, and can provide stable analysis results even with medium sample sizes. In the context of this study, SEM-PLS was used to examine how User Experience (UX), Digital Security, and Trust influence Customer Satisfaction and Customer Loyalty among BYOND BSI application users.

The analysis process was conducted through two main stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). In the outer model stage, the analysis focused on testing the quality of the indicators in reflecting the latent constructs, while in the inner model stage, the analysis was directed at examining the causal relationships between the variables in the model. Additionally, the bootstrapping method was used to test the statistical significance of each path coefficient, allowing researchers to assess whether the relationships between constructs are empirically significant. This SEM-PLS analysis allows the study to provide a

comprehensive overview of how each variable influences and contributes to the formation of loyalty in digital banking.

RESULTS AND DISCUSSION

Based on data collected from 400 respondents, this study obtained a representative picture of the characteristics of BYOND BSI app users. Many respondents were in the productive age range, 21–35 years old, reflecting the predominance of mobile banking users among young people with high levels of technology adoption. In terms of gender, the distribution of respondents was relatively balanced between men and women, indicating that BYOND BSI is preferred by both groups without significant differences. In terms of education level, many respondents had completed at least a diploma or bachelor's degree, indicating that digital banking app users possess relatively good digital literacy. Meanwhile, in terms of occupation, respondents came from diverse backgrounds, including students, private sector employees, civil servants, business owners, and professionals, reflecting the diverse characteristics of users who utilize the BYOND BSI app for various financial needs.

The duration of app usage also showed an interesting pattern. Most respondents had used BYOND BSI for at least 3–6 months since its launch as a replacement for Mobile BSI, while others had been loyal BSI app users since the BSI Mobile era. This indicates that respondents represent both new and existing users who have experienced the app transition process firsthand. Furthermore, the frequency of app use is relatively high, with many respondents opening the app more than three times per week for various purposes, such as transfers, payments, purchases, and balance checks. Overall, this respondent profile provides a clear picture that BYOND BSI users are a digitally active group, have diverse transaction needs, and are quite familiar with digital banking services. This profile provides an important basis for understanding how their perceptions of UX, digital security, trust, satisfaction, and loyalty are shaped within the BSI digital banking ecosystem.

After describing the profiles of 400 respondents, the results of data processing with SEM-PLS (SmartPLS) showed that the model built in this study has met the feasibility criteria both in terms of the measurement model (outer model) and the structural model (inner model). All indicators in the variables User Experience (UX), Digital Security, Trust, Customer Satisfaction, and Customer Loyalty have strong loading values so that they are declared valid reflecting each construct, and reliability tests (Composite Reliability and Cronbach's Alpha) also show that the instruments used are consistent and reliable. Thus, the five variables in this study can be further analyzed at the level of structural relationships between constructs.

Outer Loadings Test Results

Outer Loadings testing was conducted to assess the extent to which each indicator is able to accurately reflect the latent construct, so that it can be ensured that the research instrument has adequate convergent validity before proceeding to testing the structural model, which obtained the following results:

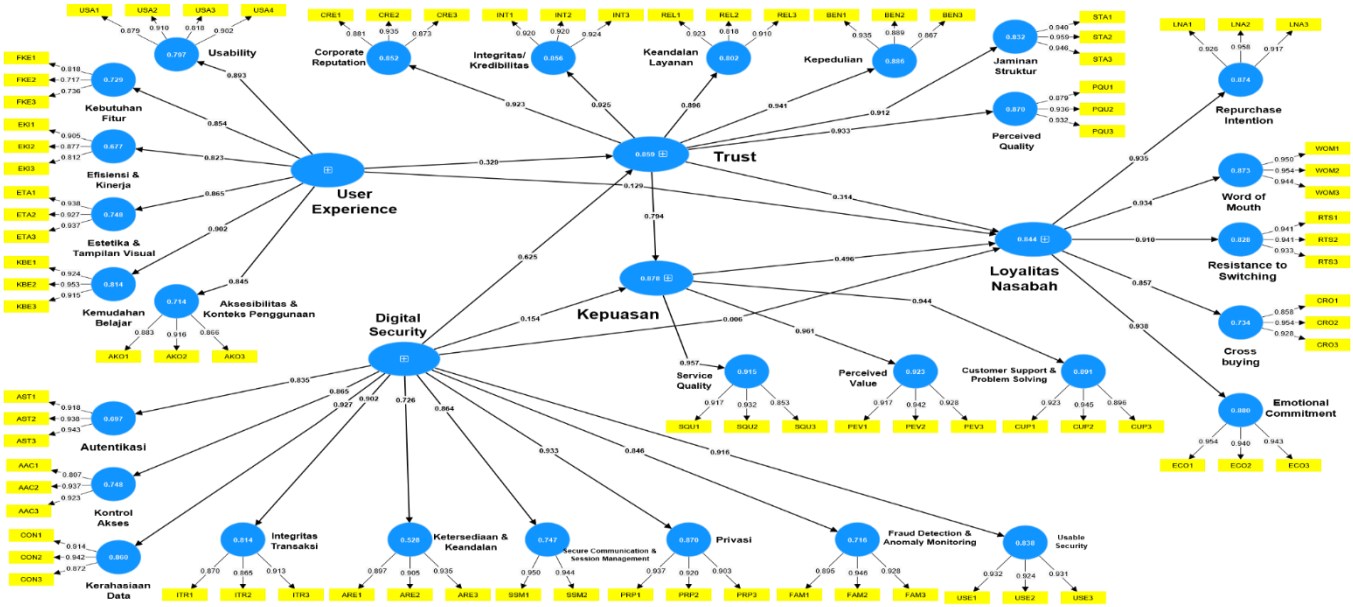

Figure 1. Full Model Algorithm Outer Loadings

The PLS structural model diagram shows the relationships between the latent variables in the study: User Experience (UX), Digital Security, Trust, Customer Satisfaction, and Customer Loyalty, along with the loading factor and path coefficient values that measure the strength of the relationships between constructs. Overall, the model shows that all indicators have outer loading values above 0.70, indicating that they are valid in reflecting the latent constructs being measured. This strengthens the reliability of the measurement model (outer model) and ensures that each variable in the study is measured consistently. The structural model (inner model) shows that UX has a positive and significant influence on Trust and Customer Satisfaction, as indicated by the relatively high path coefficient values for each relationship. This finding indicates that a good user experience—reviewed in terms of ease, efficiency, appearance, navigation, and convenience—is a crucial foundation for building trust and satisfaction in using the BYOND BSI application. Strong loading values for UX indicators such as UXA1, UXA2, UXA3, and UXB1 indicate that the user experience dimension plays a significant role in user perceptions of the application.

Furthermore, Digital Security also demonstrated a significant influence on Trust and Customer Satisfaction, as evidenced by the path coefficients in the DS → TRUS and DS → CUST relationships. Security indicators such as ENK1, ENK2, HKR1, HKR2, and HKR3 had high factor loadings, indicating that perceived security—including data protection, authentication, and security system stability—contributes significantly to building trust and increasing transaction convenience. This model confirms that in the context of Islamic mobile banking, digital security is not only a technical function but also a psychological factor that influences how users assess the application's reliability. The Trust variable appears to act as an important mediator connecting UX and Digital Security with Customer Satisfaction and Customer Loyalty. This is demonstrated by the path coefficient values from Trust to Customer Satisfaction (TRUS → CUST) and from Trust to Customer Loyalty (TRUS → LOYAL), which both show positive and significant influences. Trust indicators such as REL1–REL3, BEN1–BEN3, and INT1–INT3 show strong loadings, illustrating that perceived bank integrity, reliability, and benevolence are determining factors in users' assessments of the BYOND BSI app. Finally, the model shows that Customer Satisfaction has a significant direct influence on Customer Loyalty, as seen through the CUST → LOYAL path. The high loadings of the satisfaction indicators (SAT1–SAT3) and loyalty indicators (LOY1–LOY3) indicate that user satisfaction is a key predictor of loyalty. Users who perceive the app as meeting their transaction needs, providing a positive experience, and being safe to use are more likely to maintain its use and recommend it to others.

AVE Test (Average Variance Extracted)

The Average Variance Extracted (AVE) test was conducted to assess the extent to which each latent construct can adequately explain the variance of its indicators, so that it can be ensured that the model has strong convergent validity before proceeding to the structural analysis, which obtained the following results:

Table 2. AVE test

	Average Variance Exteracted (AVE)
Digital Security	0,634
Satisfaction	0,765
Loyalty	0,734
Trust	0,704
User Experience	0,577

Source: PLS data processing, November 2025

The Average Variance Extracted (AVE) test results in Table 2 show that all research constructs had AVE values above 0.50, thus meeting the criteria for convergent validity. The Satisfaction variable recorded the highest value at 0.765, followed by Loyalty at 0.734 and Trust at 0.704, indicating that the indicators in these three constructs were able to explain the latent variance very well. This demonstrates that user satisfaction, loyalty, and trust are strongly reflected in the indicators used, such as service quality, user commitment, perceived integrity, and bank reliability. The Digital Security variable, with an AVE value of 0.634, also demonstrates consistency in that security aspects including data protection, authentication, and transaction security—have been adequately measured by its indicators. Meanwhile, the User Experience (UX) variable achieved an AVE value of 0.577, which, although the lowest value among the other constructs, remains above the minimum threshold of 0.50 and is therefore considered valid. This value indicates that UX indicators such as ease of use, navigation, visual appearance, and application efficiency are quite capable of explaining the BYOND BSI user experience variables but also signal that UX aspects still have room for improvement, especially related to performance efficiency and accessibility which were previously found to be the dimensions with the lowest scores. Overall, the AVE results confirm that all constructs have met the

measurement feasibility standards and can be continued to the inner model analysis to test the structural relationships between variables.

Inner VIF Values (Multicollinearity Test)

Based on the research results, the following test results were obtained:

Table 3. Multicollinearity Test

	Digital Security	Satisfaction	Loyalty	Trust	User Experience
Digital Security		1,000	1,000	4,304	
Satisfaction			1,000		
Loyalty					
Trust		1,000	1,000		
User Experience			1,000	4,304	

Source: PLS data processing, November 2025

The results of the multicollinearity test indicate that all variables in the Digital Security, User Experience, Trust, Satisfaction, and Loyalty models have VIF values that are within the tolerance limit, thus the model is free from multicollinearity problems. A VIF value of 1.000 in most relationships indicates that these variables do not influence each other excessively and have a low correlation with each other. Meanwhile, the VIF value of 4.304 that appears in certain relationships, although higher than other variables, remains below the maximum threshold of 5, so it can still be categorized as acceptable multicollinearity. Overall, these results indicate that the research model has good structural stability, and each predictor variable (UX, Digital Security, and Trust) can be analyzed independently in explaining its contribution to Satisfaction and Loyalty without the risk of distortion due to multicollinearity.

Fit Model

Based on the test results, the following model fit results were obtained:

Table 4. Uji Fit Model

	Saturated Model	Estimated Model
SRMR	0,068	0,073
d_ULS	70,748	81,604
d_G	2,686	2,686
Cho-square	1167.685	1167.686
NFI	0,686	0,696

Source: PLS data processing, November 2025

The Model Fit test results show that the SRMR value for the saturated model is 0.068 and for the estimated model is 0.073, both below the threshold of 0.08, so it can be concluded that the model has a good level of fit with the data. The relatively consistent d_ULS and d_G values between the saturated and estimated models indicate that the difference between the empirical and predicted covariance matrices is at an acceptable level. In addition, the identical Chi-square values in both models (1167.685 and 1167.686) indicate the stability of the model in representing the relationship between variables. Meanwhile, the NFI value of 0.686 for the saturated model and 0.696 for the estimated model indicates a moderate level of fit but remains in the acceptable category for SEM-PLS-based research that emphasizes predictive accuracy rather than exact model fit. Overall, these results confirm that the research model has adequate fit and is suitable for testing structural relationships between variables in the context of using the BYOND BSI application.

Overall, the results of this study confirm that the quality of user experience, digital security, and trust play a fundamental role in shaping the satisfaction and loyalty of BYOND BSI application users. All series of tests starting from the inner model, multicollinearity, to the fit model indicate that the developed structural model has good feasibility and predictive power. These findings confirm that continuous improvement in aspects of application performance efficiency, security consistency, service reliability, and customer support responsiveness is key to strengthening customer satisfaction and loyalty in the era of digital banking transformation. Thus, this study not only

provides an empirical contribution to the digital banking literature but also provides strategic direction for BSI in optimizing BYOND BSI as a competitive, secure, and user-experience-oriented mobile banking service.

CONCLUSION

This study concludes that User Experience (UX), Digital Security, and Trust play a crucial and interrelated role in shaping Customer Satisfaction and contribute significantly to Customer Loyalty among BYOND BSI app users. SEM-PLS analysis results indicate that UX and Digital Security are the primary foundations influencing user perceptions, where an efficient, accessible user experience, and consistent security system can increase user trust and satisfaction. These findings reinforce previous literature emphasizing that the quality of digital interactions and security are key elements in the adoption and continued use of mobile banking. Trust has been shown to be a significant mediator in the relationship between digital experience and satisfaction, while also playing a direct role in shaping loyalty. Users who feel confident in the app's reliability and the bank's credibility tend to demonstrate stronger usage commitment and greater resistance to switching to other banking apps. Furthermore, Customer Satisfaction serves as a key driver of loyalty, where positive perceptions of service quality, perceived value, and consistent experience encourage users to continue using BYOND BSI and recommend it to others. Overall, the integrative model developed in this study proved valid and had strong explanatory power, as demonstrated by the results of convergent validity, reliability, multicollinearity, and model fit tests, which were in the good category. Empirical findings also identified several aspects that need improvement, namely application performance efficiency, accessibility, digital service reliability, and customer support quality. Improvements in these aspects will directly contribute to strengthening user satisfaction and loyalty in the future. Thus, this study makes an important contribution not only to the development of theory regarding digital banking user behavior but also provides strategic recommendations for BSI in improving the quality of BYOND BSI services as a competitive, secure, and user-oriented mobile banking platform in the era of digital transformation.

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