

DOI: <https://doi.org/10.38035/dijemss.v8i1><https://creativecommons.org/licenses/by/4.0/>

Received: 03 July 2026 | Revised: 07 July 2026 | Accepted: 23 September 2026

Acceleration of QRIS-Based Digital Financial Inclusion: Integrating Technology Acceptance and Trust Models Toward User Loyalty Through User Satisfaction

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Abstract: The digitalization of financial services through the Quick Response Code Indonesian Standard (QRIS) plays a crucial role in expanding national financial inclusion. This study aims to examine the effects of perceived ease of use, perceived usefulness, and trust on QRIS user satisfaction and loyalty. Using a quantitative approach, data were collected from 334 QRIS users in the Greater Jakarta Metropolitan Area (Jabodetabek) through a non-probability sampling technique employing purposive sampling. Data were comprehensively analysed using Structural Equation Modelling (SEM). The findings indicate that perceived usefulness, perceived ease of use, and trust have positive and significant effects on both user satisfaction and user loyalty. The findings indicate that trust has the largest direct path coefficient to user loyalty among the three antecedent variables. However, user satisfaction significantly mediates the relationships between all three antecedent variables and user loyalty, although the indirect effects are smaller than the corresponding direct effects. These findings highlight the importance of trust in explaining QRIS user loyalty. Nevertheless, the results reflect respondents' perceptions and do not establish whether actual transaction security or data protection independently determines continued usage. The academic and practical implications of this study emphasize the importance for service providers to strengthen system security architectures in order to maintain sustainable user retention.

Keywords: Perceived Ease of Use, Perceived Usefulness, Trust, User Loyalty, User Satisfaction.

INTRODUCTION

Digital technology plays a significant role in supporting economic activities and business sustainability (Andriyani et al., 2023). Technological advancements have transformed the financial sector through the rapid development of financial technology (fintech), which integrates digital information technology with financial services to provide more effective and efficient financial solutions (Azzahra & Kartini, 2022). Fintech has become an important alternative for facilitating purchasing transactions (Vhalery, 2021), particularly through digital

payment services that offer fast, convenient, and flexible payment methods capable of accommodating increasingly diverse consumer needs (Kang, 2018). According to the Financial Services Authority (OJK), fintech in Indonesia has developed into five major categories: crowdfunding, microfinancing, peer-to-peer (P2P) lending, market comparison, and digital payment systems, with digital payments becoming one of the fastest-growing segments due to the increasing adoption of cashless transactions.

Alamsyah et al. (2023) define payment as the process of transferring funds from a payer to a recipient. While conventional payment methods rely on cash, checks, or credit cards, digital payments utilize technology to process financial transactions electronically through mobile applications, electronic money, and payment cards. Digital payment systems include mobile banking, e-wallets, debit and credit cards, and the Quick Response Code Indonesian Standard (QRIS). Among these innovations, QRIS has become one of the most important digital payment instruments in Indonesia because it standardizes QR-code payments across various financial service providers, thereby improving transaction efficiency and interoperability.

The financial system, including payment infrastructure, plays an essential role in expanding financial inclusion and improving access to financial services. Nevertheless, approximately 48.24% of Indonesians aged over 15 years remained unbanked in 2021 due to high transaction costs, limited financial infrastructure, inappropriate financial products, and low financial literacy (Atmaja & Paulus, 2022). To address this challenge, the Indonesian government has promoted financial inclusion since 2012 through various cashless initiatives. One of the most significant milestones was the launch of the National Non-Cash Movement (Gerakan Nasional Non Tunai/GNNT) by Bank Indonesia in 2014, followed by the introduction and expansion of QRIS as a standardized national digital payment system. These initiatives have accelerated the adoption of digital payments while supporting a more inclusive digital economy. Consequently, understanding the determinants of QRIS adoption and continued usage has become increasingly important for regulators, financial service providers, and businesses.

The Technology Acceptance Model (TAM) developed by Davis (1989) has become one of the most widely adopted theoretical frameworks for explaining technology acceptance. TAM proposes that perceived usefulness and perceived ease of use are the two primary determinants influencing individuals' intentions to adopt and continuously use technology. Users are more likely to accept technologies that improve their performance while requiring minimal effort to operate (Davis, 1989). The model has subsequently evolved to incorporate additional determinants, including users' beliefs, experiences, and external conditions, demonstrating that technology acceptance is influenced not only by functional benefits but also by psychological and environmental factors (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Zaineldeen et al., 2020).

Previous studies consistently demonstrate that perceived usefulness significantly enhances user satisfaction by improving transaction efficiency and operational convenience (Adhiputra, 2021; Nugroho & Hidayat, 2023; Sari & Setiawan, 2022). Likewise, perceived ease of use positively affects user satisfaction because intuitive interfaces, simple navigation, and efficient transaction processes reduce users' effort and improve their overall experience (Dirnaeni et al., 2021; Rachmacandrani et al., 2023; Rahayu & Dayanti, 2021; A. Wilson & Sadiq, 2023). Beyond these two TAM constructs, trust has emerged as another crucial determinant in digital financial services because users increasingly consider transaction security, data privacy, and service reliability when adopting financial technologies. High levels of trust have been shown to increase both user satisfaction and long-term loyalty toward digital payment services (Kumar & Reinartz, 2016; Laukkanen et al., 2020; Lee & Turban, 2001; Rauf et al., 2026).

User satisfaction serves as an important mechanism linking users' evaluations of technology with their subsequent behavioral intentions. Users who perceive a digital payment

service as useful, easy to use, and trustworthy are more likely to become satisfied with the service. This satisfaction subsequently strengthens their commitment to continue using the technology and increases their willingness to recommend it to others, ultimately fostering long-term user loyalty (Juliana et al., 2021; Resika et al., 2019; N. Wilson et al., 2021). In addition, studies have shown that application quality, transaction security, system performance, and ease of interaction significantly contribute to user satisfaction, which ultimately encourages user retention (Putri & Indrawati, 2020; Risde & Kurniawati, 2022; Zulkarnaen et al., 2024).

Although previous studies have confirmed the importance of perceived usefulness, perceived ease of use, trust, satisfaction, and loyalty in technology adoption, several limitations remain. Most existing studies have examined these variables independently or within different digital payment environments, while limited research has simultaneously integrated perceived usefulness, perceived ease of use, and trust into a comprehensive structural model explaining both user satisfaction and loyalty in the Indonesian QRIS context. Furthermore, the mediating role of user satisfaction in strengthening the relationship between these antecedent variables and user loyalty has received relatively limited empirical attention. Therefore, this study develops a more comprehensive research model by integrating the core constructs of the Technology Acceptance Model with trust and user satisfaction to explain QRIS user loyalty in Indonesia.

Beyond addressing these empirical gaps, this study also offers a theoretical contribution to the digital payment adoption literature. This study integrates perceived usefulness, perceived ease of use, and trust into a structural model examining their direct relationships with user satisfaction and user loyalty, as well as the mediating role of user satisfaction. This integration extends the explanatory capability of TAM by showing that trust functions not merely as an additional antecedent but as a strategic mechanism that directly strengthens user loyalty beyond users' evaluations of usefulness and ease of use. Consequently, this study contributes to a more comprehensive understanding of post-adoption behavior in QRIS-based digital financial services, where users' continued usage depends not only on functional technology acceptance but also on confidence in transaction security, system credibility, and data protection.

Based on this background, this study aims not only to examine the effects of perceived usefulness, perceived ease of use, and trust on user satisfaction and user loyalty among QRIS users in Indonesia, but also to provide a broader theoretical explanation of post-adoption behavior by integrating the Technology Acceptance Model and Trust into a unified structural framework. Furthermore, the study investigates whether user satisfaction functions as a mediating mechanism linking technology acceptance and trust with long-term user loyalty. Accordingly, the following hypotheses are proposed:

H1: Perceived ease of use positively influences user satisfaction.

H2: Perceived usefulness positively influences user satisfaction.

H3: Trust positively influences user satisfaction.

H4: Perceived ease of use positively influences user loyalty.

H5: Perceived usefulness positively influences user loyalty.

H6: Trust positively influences user loyalty.

H7: User satisfaction positively influences user loyalty.

H8: User satisfaction mediates the relationship between perceived ease of use and user loyalty.

H9: User satisfaction mediates the relationship between perceived usefulness and user loyalty.

H10: User satisfaction mediates the relationship between trust and user loyalty.

METHOD

This study utilized primary data collected through questionnaires distributed via social media using Google Forms. The population consisted of all QRIS users in the Greater Jakarta Metropolitan Area (Jabodetabek). QRIS users included individuals from various age groups and economic backgrounds who use QRIS for daily financial transactions. The sample was

selected using a non-probability purposive sampling technique to ensure that respondents had prior experience using QRIS for digital payment transactions. This approach enabled the researchers to collect data from participants who possessed relevant knowledge and practical experience regarding the phenomenon under investigation. However, because purposive sampling does not provide every member of the population with an equal probability of selection, the findings should be interpreted with caution and cannot be generalized to all QRIS users in Indonesia. Nevertheless, this sampling approach is considered appropriate for theory-testing studies employing PLS-SEM, where the primary objective is to examine structural relationships among constructs rather than to estimate population parameters. The research sample consisted of QRIS users in Jabodetabek. The research instrument employed a five-point Likert scale, where: 1 (one) strongly disagree, 2 (two) disagree, 3 (three) neutral, 4 (four) agree, 5 (five) strongly agree. The study obtained 342 questionnaire responses, of which 334 were retained for analysis. The sample size should be evaluated in relation to the structural model's complexity and statistical power requirements. Accordingly, an appropriate statistical power analysis is required to substantiate the adequacy of the final sample for PLS-SEM. The study successfully collected 342 responses, of which 334 questionnaires were valid and usable, and has met the sample adequacy requirements.

Data Analysis Technique

Data analysis was conducted using Partial Least Squares–Structural Equation Modelling (PLS-SEM) with the assistance of SmartPLS software. PLS-SEM was selected because of its capability to evaluate complex models containing mediating variables (user satisfaction) without requiring strict assumptions regarding data normality (Hair et al., 2019). The analysis procedure consisted of two stages:

Outer Model Evaluation (Measurement Model): This stage examined convergent validity (Loading Factor > 0.70 and Average Variance Extracted (AVE) > 0.50), discriminant validity using both the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT), instrument reliability (Cronbach's Alpha > 0.70 and Composite Reliability > 0.70), and collinearity assessment using the Variance Inflation Factor (VIF). The inner VIF values were examined to assess collinearity among the predictor constructs. All reported values were below 3.3, indicating no substantial collinearity concerns according to the selected threshold. However, these results alone are insufficient to rule out common method bias.

Inner Model Evaluation (Structural Model): This stage examined path coefficients, significance levels ($p\text{-value} < 0.05$), coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) obtained through the blindfolding procedure, and mediation analysis according to hypotheses H8, H9, and H10.

RESULTS AND DISCUSSION

This study involved 334 respondents selected based on the characteristics of gender, age, highest educational attainment, occupation, and domicile. Based on gender, the respondents consisted of 122 males and 212 females. In terms of age, the majority of respondents belonged to the Millennial generation aged 28–43 years (163 individuals), followed by Generation Z aged 18–27 years (108 individuals), and Generation X aged 44–59 years (63 individuals). Regarding educational attainment, respondents were dominated by bachelor's degree graduates (102 individuals), followed by postgraduate degree holders (90 individuals), diploma graduates (88 individuals), and senior high school/vocational high school graduates (54 individuals). Based on occupation, the majority of respondents were teachers or lecturers (89 individuals), followed by university students (63 individuals), entrepreneurs (61 individuals), private-sector employees (57 individuals), and civil servants (55 individuals). The remaining respondents consisted of homemakers, drivers, and individuals who were unemployed. Based on domicile, the largest proportion of respondents resided in Depok (90 individuals), followed by Bogor (89

individuals), Jakarta (71 individuals), Tangerang (47 individuals), and Bekasi (37 individuals). The collected data were subsequently analysed to determine their validity and reliability.

Model Evaluation

The measurement model (outer model) evaluation was conducted to ensure that the indicators used were valid and reliable in representing the latent variables. The assessment was carried out through convergent validity, discriminant validity, and composite reliability testing.

Convergent Validity

Convergent validity was measured using the loading factor and Average Variance Extracted (AVE) values. In this study, the minimum threshold for the loading factor was set at 0.70, while the AVE value was required to exceed 0.50 for a construct to be considered valid. The results indicated that all indicators of the variables perceived ease of use (PEU), perceived usefulness (PU), Trust (TR), User Satisfaction (US), and User Loyalty (UL) had outer loading values above 0.70, thereby meeting the convergent validity criteria.

Table 1. Convergent Validity Test

Variable	Item	Loading Factor	Description
Perceived Ease of Use	PEU1	0,742	Valid
	PEU2	0,746	Valid
	PEU3	0,751	Valid
	PEU4	0,782	Valid
	PEU5	0,707	Valid
	PEU6	0,770	Valid
	PEU7	0,760	Valid
Perceived Usefulness	PU1	0,729	Valid
	PU2	0,712	Valid
	PU3	0,808	Valid
	PU4	0,775	Valid
	PU5	0,779	Valid
	PU6	0,801	Valid
	PU7	0,755	Valid
Trust	TR1	0,842	Valid
	TR2	0,734	Valid
	TR3	0,821	Valid
	TR4	0,845	Valid
	TR5	0,854	Valid
User Satisfaction	US1	0,857	Valid
	US2	0,862	Valid
	US3	0,870	Valid
User Loyalty	UL1	0,727	Valid
	UL2	0,765	Valid
	UL3	0,714	Valid
	UL4	0,784	Valid
	UL5	0,717	Valid

Source: SmartPLS Output

Discriminant Validity

Discriminant validity is used to assess the ability of indicators to distinguish the construct being measured from other constructs. The assessment was conducted using cross-loading values and the Fornell–Larcker criterion. A construct is considered valid when its cross-loading values and the square root of the Average Variance Extracted (AVE) are greater than its correlations with other constructs, with the required threshold value exceeding 0.70.

Table 2. Fornell–Larcker Criterion

Variable	Trust	User Satisfaction	User Loyalty	Perceived Usefulness	Perceived Ease of Use
Trust	0.820				
User Satisfaction	0.395	0.863			
User Loyalty	0.523	0.508	0.742		
Perceived Usefulness	0.466	0.420	0.477	0.766	
Perceived Ease of Use	0.338	0.335	0.445	0.380	0.751

Source: SmartPLS Output

The Fornell–Larcker results presented in Table 2 indicate that the square root of the AVE for each construct exceeds its correlations with the other constructs. These findings provide support for discriminant validity. The assessment is further supported by the HTMT results presented in Table 3.

Heterotrait–Monotrait Ratio (HTMT)

In addition to the Fornell–Larcker criterion, discriminant validity was further assessed using the Heterotrait–Monotrait Ratio (HTMT). According to Henseler et al. (2015), HTMT values below 0.90 indicate adequate discriminant validity. As presented in Table 3, all HTMT values ranged from 0.382 to 0.620, which are below the recommended threshold. These findings confirm that each construct is empirically distinct from the others.

Table 3. HTMT Values

Construct	Highest HTMT
Trust – User Satisfaction	0.457
Trust – User Loyalty	0.620
Trust – Perceived Usefulness	0.529
Trust – Perceived Ease of Use	0.382
User Satisfaction – User Loyalty	0.618
User Satisfaction – Perceived Usefulness	0.487
User Satisfaction – Perceived Ease of Use	0.384
User Loyalty – Perceived Usefulness	0.562
User Loyalty – Perceived Ease of Use	0.528
Perceived Usefulness – Perceived Ease of Use	0.425

Source: SmartPLS Output

Reliability

Reliability testing in PLS was conducted using Cronbach’s Alpha and Composite Reliability values. A variable is considered reliable when both the Composite Reliability and Cronbach’s Alpha values exceed 0.70. The results indicated that all research variables achieved Composite Reliability and Cronbach’s Alpha values above 0.70. Therefore, all variables were deemed reliable and demonstrated a high level of consistency, allowing the analysis to proceed to the evaluation of the inner model and the model goodness-of-fit.

Table 4. Reliability Test Results

Variable	Cronbach’s Alpha	Composite Reliability
Trust	0.878	0.911
User Satisfaction	0.829	0.897
User Loyalty	0.796	0.859
Perceived Usefulness	0.883	0.909
Perceived Ease of Use	0.872	0.901

Source: SmartPLS Output

Collinearity Assessment

Collinearity among predictor constructs was evaluated using the inner Variance Inflation Factor (VIF). All VIF values were below 3.3, indicating that multicollinearity was not a concern. Although these findings reduce concerns regarding collinearity, future studies may complement this assessment using additional procedures for evaluating common method bias.

Table 5. Inner VIF Values

Relationship	VIF
Trust → User Satisfaction	1.329
Trust → User Loyalty	1.394
User Satisfaction → User Loyalty	1.332
Perceived Usefulness → User Satisfaction	1.376
Perceived Usefulness → User Loyalty	1.463
Perceived Ease of Use → User Satisfaction	1.215
Perceived Ease of Use → User Loyalty	1.251

Source: SmartPLS Output

Structural Model Evaluation (Inner Model)

The structural model (inner model) evaluation was conducted to examine the relationships among the latent variables according to the research hypothesis. The assessment was carried out through model fit, R-square values, and path coefficients. The model fit results indicated an SRMR value of 0.06, suggesting that the model demonstrated a good fit, as it was below the threshold value of 0.10 (Hair et al., 2019).

Table 6. R-Square Test Result

Variable	R-Square
User Satisfaction	0,249
User Loyalty	0,445

Source: SmartPLS Output

Based on the R-square values, user satisfaction could be explained by perceived ease of use, perceived usefulness, and trust by 24.9%, while the remaining 75.1% was influenced by other variables outside the scope of this study. Meanwhile, user loyalty could be explained by perceived ease of use, perceived usefulness, trust, and user satisfaction by 44.5%, whereas the remaining 55.5% was influenced by other factors not included in the model. These results indicate that the proposed predictors explain a larger proportion of the variance in user loyalty (44.5%) than in user satisfaction (24.9%). However, R^2 reflects explanatory power rather than out-of-sample predictive performance.

Effect Size (f^2)

Effect size (f^2) was assessed to determine the contribution of each exogenous construct to the endogenous variables. Following Cohen's guidelines, values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively. As presented in Table 7, all constructs demonstrated small effect sizes, with Trust showing the largest contribution to User Loyalty.

Table 7. Effect Size (f^2)

Relationship	f^2	Interpretation
Trust → User Satisfaction	0.049	Small
Trust → User Loyalty	0.098	Small
User Satisfaction → User Loyalty	0.094	Small
Perceived Usefulness → User Satisfaction	0.063	Small
Perceived Usefulness → User Loyalty	0.032	Small

Perceived Ease of Use → User Satisfaction	0.029	Small
Perceived Ease of Use → User Loyalty	0.059	Small

Source: SmartPLS Output

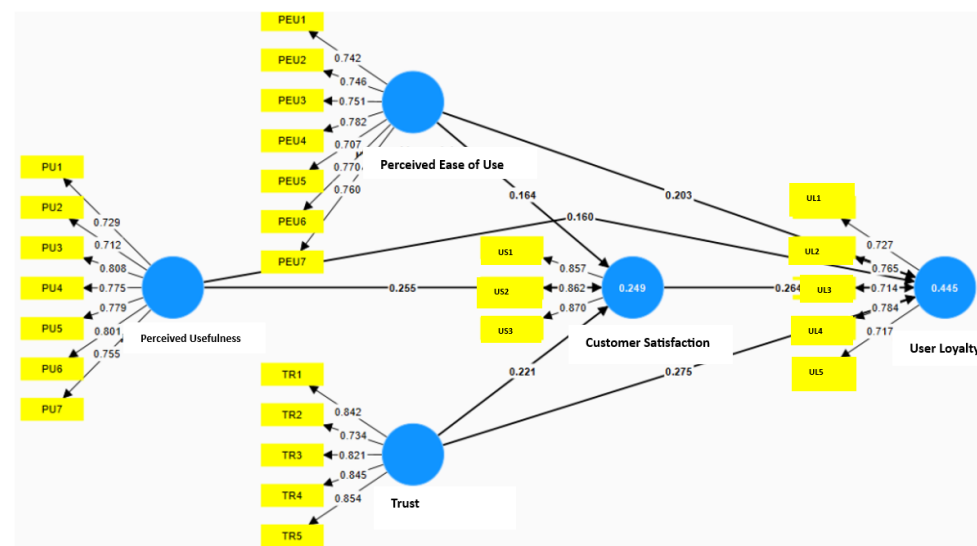
Predictive Relevance (Q^2)

Predictive relevance was evaluated using the blindfolding procedure. Hair et al. (2022) state that Q^2 values greater than zero indicate that the model has predictive relevance. As shown in Table 8, the Q^2 values for User Satisfaction and User Loyalty were 0.180 and 0.238, respectively. Both endogenous constructs obtained positive blindfolding-based Q^2 values, indicating predictive relevance according to this criterion. However, an additional out-of-sample predictive assessment would be necessary to evaluate the model's predictive performance more comprehensively.

Table 8. Predictive Relevance (Q^2)

Endogenous Variable	Q^2	Endogenous Variable
User Satisfaction	0.180	User Satisfaction
User Loyalty	0.238	User Loyalty

Source: SmartPLS Output



Source: Research Results

Figure 1. Structural Model

This study employed the Partial Least Squares (PLS) method, which offers several advantages, including the absence of a requirement for normally distributed data, applicability across various measurement scales, suitability for relatively small sample sizes, and support for both reflective and formative indicators. Hypothesis testing was based on the path coefficient values, with the criteria of p -value < 0.05 and T -statistic > 1.960 indicating a significant relationship between exogenous and endogenous variables. Each hypothesized relationship was tested using the bootstrapping procedure. The following presents the results of the bootstrapping analysis:

Table 9. Hypothesis Testing Results

Variable	Original Sample (O)	T-Statistics ($ O/STDEV $)	P-Values
Perceived Ease of Use → User Satisfaction	0.164	2.678	0.007

Perceived Usefulness → User Satisfaction	0.255	3.686	0.000
Trust → User Satisfaction	0.221	3.805	0.000
Perceived Ease of Use → User Loyalty	0.203	3.261	0.001
Perceived Usefulness → User Loyalty	0.160	2.130	0.033
Trust → User Loyalty	0.275	4.597	0.000
User Satisfaction → User Loyalty	0.264	4.672	0.000
Perceived Ease of Use → User Satisfaction → User Loyalty	0.043	2.178	0.029
Perceived Usefulness → User Satisfaction → User Loyalty	0.067	3.153	0.002
Trust → User Satisfaction → User Loyalty	0.058	2.694	0.007

Source: SmartPLS Output

The results of hypothesis testing (H1) indicate that Perceived Ease of Use has a positive and significant effect on User Satisfaction, supporting the hypothesis. The positive original sample coefficient demonstrates that the easier QRIS is to use, the higher the level of user satisfaction. Ease of use is reflected in fast and efficient payment processes, flexibility in various transaction types, easily understandable information, ease of learning and teaching QRIS usage to others. These characteristics enhance users' comfort and confidence when conducting transactions. This finding aligns with the studies of Nuryakin & Naili (2016) and Chiguvi & Guruwo (2017), which found that ease of use positively influences user satisfaction.

The results of hypothesis testing (H2) demonstrate that Perceived Usefulness positively and significantly affects User Satisfaction; therefore, the hypothesis is accepted. The positive coefficient indicates that the greater the benefits perceived from QRIS usage, the higher the user satisfaction. Users perceive QRIS as capable of increasing transaction effectiveness, improving efficiency, accelerating payment processes, reducing waiting time, simplifying activities such as shopping and bill payments. These benefits enhance the overall user experience and consequently improve satisfaction. This finding supports the results of Pasaribu et al. (2024), who found that perceived usefulness positively and significantly influences user satisfaction because useful technology fulfills users' transactional needs and expectations.

The results of hypothesis testing (H3) indicate that Trust has a positive and significant effect on User Satisfaction, supporting the hypothesis. The positive coefficient suggests that higher levels of trust in QRIS lead to higher levels of user satisfaction. User trust is reflected through feelings of security during transactions, confidence that QRIS originates from a reliable source, protection of personal information, belief that QRIS simplifies payment activities. These factors create positive experiences and increase users' convenience in using QRIS. This finding aligns with Ratri et al. (2024), who concluded that trust positively affects user satisfaction and contributes to strengthening customer loyalty.

The results of hypothesis testing (H4) reveal that Perceived Ease of Use positively and significantly affects User Loyalty, thus supporting the hypothesis. The positive coefficient indicates that easier QRIS usage leads to stronger user loyalty. Ease of use creates convenient experiences, accessible services, efficient transactions. These characteristics encourage users to continue using the service repeatedly. Although its influence is not the strongest among the independent variables, perceived ease of use remains important in building user loyalty. This finding is consistent with Gefen et al. (2003), who argued that service convenience and ease of use enhance user satisfaction.

The results of hypothesis testing (H5) demonstrate that Perceived Usefulness positively and significantly affects User Loyalty, supporting the hypothesis. The positive coefficient indicates that greater perceived benefits and added value from QRIS users lead to higher levels of loyalty. Users who perceive QRIS as effective and efficient in facilitating daily transactions

tend to remain loyal to the service. This finding is consistent with Davis (1989) and Gefen et al. (2003), who emphasized the critical role of perceived usefulness in increasing loyalty toward technology and digital services.

The results of hypothesis testing (H6) indicate that Trust positively and significantly affects User Loyalty, supporting the hypothesis. The positive coefficient demonstrates that higher trust in QRIS results in stronger user loyalty. User trust is reflected in the belief that transactions are secure and personal data is protected, thus making users feel comfortable using the QRIS payment system. Trust has the largest direct path coefficient to user loyalty among the three antecedent variables examined in this study. Nevertheless, differences in the estimated coefficients should be interpreted cautiously unless their statistical significance has been formally tested. This finding supports the studies of Gefen et al. (2003) and Tommy et al. (2024), which emphasized the critical role of trust in fostering loyalty, particularly in digital financial and technology-based services. The stronger influence of trust compared with perceived usefulness and perceived ease of use reflects the distinctive characteristics of digital financial services, where users face higher levels of uncertainty, perceived financial risk, and privacy concerns. Unlike conventional service settings, digital payment systems require users to entrust sensitive financial information to electronic platforms. Consequently, trust becomes a prerequisite for sustained usage because it reduces users' concerns regarding transaction security, personal data protection, and system reliability. When users perceive QRIS as secure and credible, they are more likely to remain loyal even if their satisfaction is not exceptionally high. This finding extends the Technology Acceptance Model by suggesting that cognitive evaluations represented by perceived usefulness and perceived ease of use alone are insufficient to explain post-adoption behavior in digital financial ecosystems. Instead, relational beliefs represented by trust complement the traditional TAM constructs and become increasingly important in sustaining long-term user loyalty.

The results of hypothesis testing (H7) indicate that User Satisfaction positively and significantly affects User Loyalty, supporting the hypothesis. The positive coefficient indicates that higher levels of satisfaction correspond to stronger loyalty toward QRIS. User satisfaction is reflected through comfortable transaction experiences, ease of use, perceived benefits, and trust in system security in QRIS. These positive experiences encourage users to continue utilizing QRIS consistently in the future. This finding is consistent with Wahyudi et al. (2021), who reported that user satisfaction has a positive and significant effect on user loyalty.

The results of hypothesis testing (H8) indicate that Perceived Ease of Use positively and significantly affects User Loyalty through User Satisfaction. However, the indirect effect (0.043) is smaller than the direct effect (0.203). This result suggests that user satisfaction does not serve as the primary mediator in this relationship. Therefore, QRIS user loyalty is influenced more strongly by ease of use directly than through satisfaction. Users may remain loyal simply because QRIS is easy to use, even without necessarily experiencing high levels of satisfaction. This finding is consistent with Suhartanto et al. (2020), who found that user satisfaction functions only as a partial and non-dominant mediator.

The results of hypothesis testing (H9) indicate that Perceived Usefulness positively and significantly affects User Loyalty through User Satisfaction. However, the indirect effect (0.067) is lower than the direct effect (0.160). Thus, user satisfaction does not serve as the primary mediating variable. These findings indicate that user loyalty is more directly influenced by the benefits and usefulness of QRIS than by user satisfaction. Users remain loyal because QRIS provides real, effective, and efficient benefits in their daily transactions, even without a high level of satisfaction. This finding supports Pasaribu et al. (2024), who reported that perceived usefulness positively influences loyalty because users tend to continue using technologies that enhance efficiency and ease and convenience of transactions.

The results of hypothesis testing (H10) indicate that Trust positively affects User Loyalty through User Satisfaction. However, the direct effect of trust on user loyalty (0.275) is greater

than the indirect effect through user satisfaction (0.058). User satisfaction significantly mediates the relationship between trust and user loyalty. However, the estimated indirect effect ($\beta = 0.058$) is smaller than the direct effect ($\beta = 0.275$). Since both effects are statistically significant, the findings are consistent with complementary partial mediation. Trust is manifested through transaction security, system credibility, and protection of user data, making it the most dominant factor in building loyalty. This finding is consistent with the studies of Shao et al. (2019) and Cahaya et al. (2024), which concluded that trust exerts a direct and significant influence on loyalty in digital financial and technology-based services. The relatively weak mediating role of user satisfaction suggests that QRIS users prioritize confidence in transaction security over affective evaluations derived from previous usage experiences. In digital payment ecosystems, users are exposed to financial, technological, and privacy risks. Therefore, trust functions as a direct relational mechanism that strengthens loyalty independently of users' satisfaction levels. The significant direct relationship between trust and user loyalty suggests that trust may contribute to loyalty beyond its indirect relationship through user satisfaction. However, the present analysis does not establish how this relationship varies across different levels of satisfaction. This finding contributes to the digital financial inclusion literature by indicating that trust is not merely an antecedent of satisfaction but also an independent strategic determinant of loyalty. Consequently, QRIS providers should prioritize cybersecurity, privacy protection, institutional transparency, and transaction reliability to cultivate long-term customer loyalty.

Although the present findings provide meaningful insights into the determinants of QRIS user loyalty, they should be interpreted within the context of the selected respondents. Because the study employed purposive sampling focusing on QRIS users in the Greater Jakarta Metropolitan Area, the structural relationships identified may not fully represent users from other regions of Indonesia with different socioeconomic characteristics, levels of digital literacy, or financial service accessibility. Consequently, caution is warranted when extending these findings to the broader Indonesian population.

CONCLUSION

From a theoretical perspective, this study extends the Technology Acceptance Model by integrating trust as a complementary relational construct in explaining QRIS user loyalty. The findings demonstrate that although perceived usefulness and perceived ease of use remain important determinants of post-adoption behavior, trust exerts the strongest direct influence on user loyalty. This indicates that in digital financial services, users' confidence in transaction security and system credibility plays a more decisive role than technology acceptance alone. The empirical findings of this study demonstrate that Perceived Ease of Use, Perceived Usefulness, and Trust positively influence both User Satisfaction and User Loyalty toward QRIS. Among these variables, Trust emerged as the most dominant factor in shaping user loyalty. These findings suggest the need for future studies to develop more comprehensive models that further investigate the determinants of trust, perceived usefulness, and perceived ease of use in digital payment systems. Future research should also explore specific conditions under which user satisfaction may serve as a stronger mediator in the formation of user loyalty. The practical implication for QRIS service providers is to continuously improve system usability, transaction security, personal data protection, and service accessibility. This study is limited not only by the number of variables and respondents but also by the use of non-probability purposive sampling, which limits the generalizability of the findings beyond the sampled QRIS users in the Greater Jakarta Metropolitan Area. Consequently, the findings should be interpreted within this specific context. Future studies are encouraged to employ probability sampling techniques and broader geographical coverage to improve external validity. Enhancing these aspects will enable users to experience greater convenience, efficiency, and security when conducting digital transactions. Such improvements are expected

to increase both the adoption and long-term loyalty of QRIS users. For society, strengthening the security and reliability of QRIS services will contribute to a safer and more trustworthy digital transaction environment. This study has several limitations. First, the use of non-probability purposive sampling limits the generalizability of the findings beyond the sampled QRIS users in the Greater Jakarta Metropolitan Area (Jabodetabek). Therefore, the results should be interpreted within the context of respondents who have direct experience using QRIS rather than representing all Indonesian digital payment users. Second, the study examined only three antecedent variables, perceived ease of use, perceived usefulness, and trust, while other important determinants such as perceived risk, service quality, perceived security, digital literacy, and habit were not included. Future studies are encouraged to employ probability sampling techniques with broader geographical coverage and incorporate additional explanatory variables to improve the external validity and comprehensiveness of the research model.

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