Fintech Adoption and Customer Loyalty in Indonesian Banking: The Mediating Role of Trust in the Perceived Benefit–Risk Trade-Off

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ABSTRACT

Financial technology (fintech) is reshaping banking by offering efficiency and accessibility, yet customer loyalty depends on balancing perceived benefits and risks. This study examines how fintech adoption influences loyalty through the mediating role of trust, with perceived benefit and perceived risk as antecedents. A quantitative survey of 150 Bank Rakyat Indonesia (BRI) customers in Tangerang was analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). Results show that fintech adoption significantly increases perceived benefits, which positively affect trust, while perceived risk exerts a negative but insignificant influence. Trust does not directly predict loyalty but partially mediates the benefit–loyalty relationship. These findings highlight the benefit–risk trade-off in fintech adoption and underscore the importance of enhancing trust to sustain customer loyalty. The study contributes to fintech adoption theory and provides practical guidance for banks to improve customer experience while mitigating risks.

INTRODUCTION

The rapid growth of fintech has transformed the Indonesian banking landscape, particularly through mobile and internet banking (Deng et al., 2023). Bank BRI, one of the largest state-owned banks, has aggressively integrated digital platforms to support customer transactions. However, challenges remain, especially concerning security concerns, fraud, and data privacy breaches, which reduce public trust (Idris Balaka et al., 2024) ; (Adi Ahdiat, 2024).

OJK, (2023) reported that Indonesia contributes to nearly 40% of ASEAN's digital transaction value. However, cyberattacks and leakage of over 94 million accounts in 2023 triggered skepticism toward digital banking services. Trust, therefore, becomes a crucial determinant of whether fintech adoption can foster customer loyalty (Jafri et al., 2024).

Previous research mainly focuses on fintech startups or private banks, while studies on BRI customers remain scarce. Most examined direct links between technology and loyalty without adequately addressing the mediating role of trust (Azwar et al., 2019). Furthermore, empirical results remain inconsistent. Triwardhani et al., (2023), found that risk perception reduces trust, while Habibi et al., (2024), showed perceived benefits improve trust but did not extend the analysis to loyalty.

This study fills the research gap by analyzing fintech adoption at Bank BRI with trust as a mediator between perceived benefit, perceived risk, and loyalty. The novelty lies in testing a more comprehensive causal framework in the context of state-owned banking customers, using SEM-PLS. Findings are expected to enrich theory and provide practical strategies to reinforce loyalty in digital financial ecosystems.

Literature Review

This study is grounded in the Technology Acceptance Model (TAM) and Trust Theory. TAM posits that technology adoption depends on *perceived usefulness* and *perceived ease of use*, which shape behavioral intention (Hu et al., 2019). In digital banking, TAM has been

extended with trust, risk, and satisfaction, and remains a robust predictor of fintech adoption (Monterde-I-bort et al., 2022).

Trust Theory emphasizes customer confidence in the security, privacy, and reliability of services under uncertainty (Saif et al., 2022). In fintech, trust not only reduces perceived risk but also strengthens loyalty (Nguyen & Hoang, 2024); (Jafri et al., 2024).

1. Customer Loyalty

Customer loyalty in the banking context is defined as a customer's commitment to consistently use the same bank's services despite the availability of potentially more attractive alternatives. Loyalty reflects not only repeated usage but also a long-term emotional attachment and trust in the quality, security, and integrity of banking services provided (Hoang, 2024).

Loyal customers also demonstrate willingness to recommend the bank to others and maintain long-term engagement with its services. Beyond repeat transactions, they actively contribute to strengthening the bank's reputation within their social and professional networks (Nadhifa *et al.*, 2023).

The key indicators of loyalty are closely linked to customer satisfaction, which often acts as a mediating factor between service quality and loyalty outcomes. High levels of satisfaction are associated with stronger commitment, positive word-of-mouth, and sustained service usage (Muhammad Agus Supriyanto et al., 2023; Nadhifa et al., 2023; Zaid et al., 2020).

2. Customer Trust

Customer trust in digital banking refers to the confidence customers place in the reliability, security, and integrity of financial technologies. Trust is strongly associated with perceptions of service quality; the higher customers perceive technology to be dependable, the more likely they are to continue using it, even in uncertain digital environments (Alsmadi et al., 2022).

Trust can be assessed through several key indicators. First, perceived security reflects customer confidence that their personal and financial data are adequately protected (Nangin et al., 2020). Second, perceived privacy relates to assurance that sensitive information remains confidential, particularly within open banking systems (Wang, 2023). Third, perceived reliability concerns the belief that digital banking services are consistently dependable and free from disruption (Saif et al., 2022). Fourth, perceived usefulness captures the extent to which customers believe fintech provides tangible benefits such as efficiency in cost and time (Johnpaul & Aluvala, 2021). Finally, bank communication and promotion regarding security, benefits, and features further enhance customer confidence and strengthen trust in adopting digital financial services (Imelda et al., 2022).

3. Perceived Benefit

Perceived benefit refers to customers' belief that the use of financial technology enhances performance and productivity in financial activities. In the banking sector, services such as internet banking and mobile banking are considered to make transactions faster, safer, and more convenient than traditional methods, thereby encouraging broader adoption (Nelwan *et al.*, 2021).

Several indicators capture perceived benefit. First, perceived usefulness highlights efficiency and productivity gains, as transactions can be completed more quickly without the need to visit physical bank branches (Purnamasari *et al.*, 2024). Second, ease of access reflects the ability to conduct transactions anytime and anywhere, offering greater flexibility to users (Ly & Ly, 2022). Third, security assurance ensures that customers' financial and

personal data are protected, thereby enhancing user comfort and trust (Marlina Wijayanti et al., 2024). Fourth, transaction cost reduction positions digital banking as more economical compared to manual transactions (Okoli & Tewari, 2020). Finally, service reliability emphasizes the ability of the system to deliver stable and consistent services, reinforcing customers' trust and willingness to adopt fintech services (Yoon & Lim, 2021).

4. Perceived Risk

Perceived risk refers to customers' evaluation of potential losses when using financial technologies such as internet banking and mobile banking. These risks encompass financial, privacy, and security concerns, including the possibility of data breaches, fraud, or account hacking. Such considerations often lead to hesitation in adopting digital services, particularly when systems are perceived as insufficiently secure or transparent (Hu *et al.*, 2019; Jafri *et al.*, 2024).

In the banking context, perceived risk consists of five key indicators. First, security risk reflects concerns about hacking or unauthorized access to accounts (Li *et al.*, 2023). Second, financial risk refers to potential monetary losses caused by system errors or failed transactions (Tanuwijaya & Zainul Arifin, 2023). Third, performance risk captures doubts regarding the reliability and consistency of digital services (Dharmastuti *et al.*, 2022). Fourth, privacy risk highlights concerns over the misuse or leakage of personal data to third parties (Wang, 2023). Finally, time risk relates to wasted time due to delays or system failures in conducting transactions (Saif *et al.*, 2022).

5. Financial Technology

Financial Technology (Fintech) refers to the application of digital technologies in financial services to provide faster, safer, and more efficient access for users. Fintech covers services such as digital payments, online lending, and investment management, supported by modern technologies including blockchain, artificial intelligence, and cloud computing (Deng *et al.*, 2023; Khan *et al.*, 2023).

The implementation of fintech in banking services can be evaluated through five key indicators. First, service accessibility enables customers to conduct transactions anytime and anywhere through internet and mobile banking (Nadikattu, 2020). Second, transaction speed and efficiency allow real-time processes that reduce operational costs and improve customer convenience (Vyadrova et al., 2022). Third, transaction security relies on encryption, authentication, and cybersecurity systems that strengthen customer trust(Hakeem & Ratnasari, 2021). Fourth, financial inclusion highlights fintech's capacity to reach underserved populations previously excluded from traditional banking (Balthazaar, 2023). Finally, lower transaction costs provide financial benefits for customers while enhancing banks' competitiveness in the digital economy (Switbert & Baleche, 2022).

METHOD

This study adopted a quantitative explanatory design using SEM-PLS to test causal relationships among perceived benefit, perceived risk, trust, and loyalty in BRI's digital banking services. The population comprised BRI customers in Tangerang using mobile or internet banking. A purposive sampling technique was employed, yielding 150 valid responses, exceeding the minimum sample size recommended for SEM.

Data were collected through a 5-point Likert scale questionnaire adapted from prior studies. Measurement validity and reliability were evaluated through AVE (> 0.5) and CR (> 0.7), while discriminant validity followed HTMT criteria (Henseler et al., 2015). Structural paths were assessed with bootstrapping (5,000 resamples**)**, examining R^2 and path

significance (Hair, Jr. et al., 2022). This method is widely used for predictive modeling in fintech adoption research (Jafri et al., 2024).
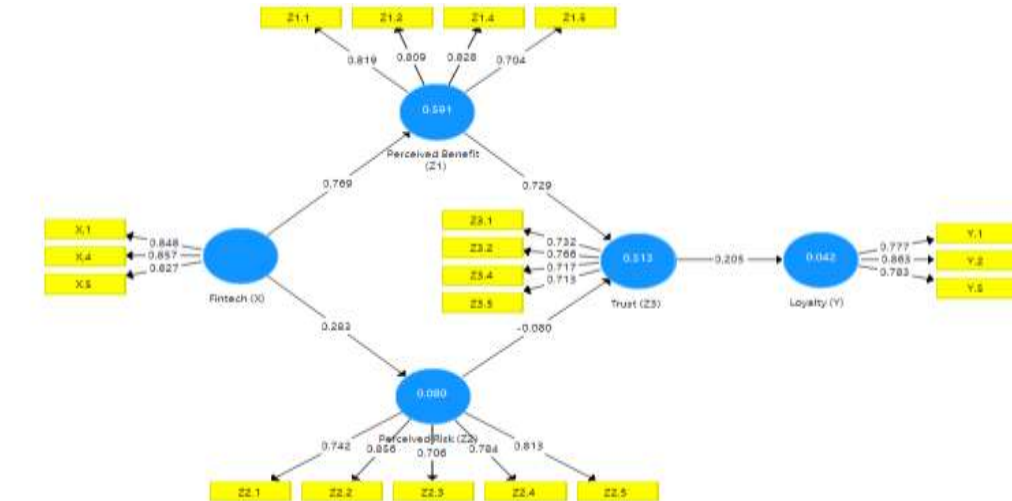
RESULTS AND DISCUSSION

Figure 1. PLS Algorithm

The data in the table represent the results of the PLS Algorithm based on respondents' questionnaire responses. In assessing the outer model validity, indicators with loading factors below 0.50 were removed to ensure data accuracy and validity. The final results showed that all retained items had loading factors above 0.50, confirming that the indicators were valid in terms of convergent validity and appropriately represented the latent constructs measured. Convergent validity is considered sufficient when outer loadings exceed 0.50 and the construct demonstrates internal consistency reliability (Hair et al., 2019)). This finding indicates that the measurement model used in this study meets the statistical requirements for representing latent variables effectively (Hair, Jr. et al., 2022).

1. Validity and Reliability Test

TABLE 1: Validity and Reliability Test

	Cronbach's Alpha	Composite Reliability	Average Varianece Extracted (AVE)
Perceived Benefit (Z1)	0,800	0,870	0,627
Fintech (X)	0,798	0,881	0,712
Loyalty (Y)	0,734	0,850	0,654
Perceived Risk (Z2)	0,843	0,887	0,612
Trust (Z3)	0,712	0,882	0,536

The measurement model was evaluated through convergent validity, discriminant validity, and reliability. Convergent validity was assessed using Average Variance Extracted (AVE), with all constructs exceeding the threshold of 0.50, indicating that more than half of the variance in each construct was explained by its indicators (Prastowo et al., 2024). As shown in Table 1, AVE values ranged from 0.536 to 0.712, confirming satisfactory convergent validity.

Reliability was tested using Cronbach's Alpha and Composite Reliability (CR). All values exceeded the recommended cutoff of 0.70, demonstrating internal consistency (Hair, et al., 2022). Cronbach's Alpha values ranged from 0.712 to 0.843, while CR values ranged

from 0.850 to 0.887. These results confirm that the questionnaire items were both reliable and valid for measuring perceived benefit, fintech adoption, perceived risk, trust, and loyalty.

2. Discriminant Validity Test

Discriminant validity was assessed using the Fornell-Larcker criterion.

TABLE: 2 Discriminant Validity Test

	Fintech (X)	Loyalty (Y)	Perceived Benefit (Z1)	Perceived Risk (Z2)	Trust (Z3)
Fintech (X)	0,844				
Loyalty (Y)	0,156	0,561			
Perceived Benefit (Z1)	0,769	0,130	0,792		
Perceived Risk (Z2)	0,283	0,046	0,214	0,782	
Trust (Z3)	0,602	0,205	0,712	0,076	0,732

As shown in Table 2, the square root of the AVE for each construct is higher than its correlations with other constructs. This indicates that each construct shares more variance with its own indicators than with other latent variables, thereby confirming discriminant validity of the measurement model (Henseler et al., 2015); (Sarstedt, 2019) ; (Prastowo et al., 2023).

3. Discriminant Validity (HTMT Criterion)

TABLE: 3 Heteroit-Monotrait Ratio (HTMT)

	Fintech (X)	Loyalty (Y)	Perceived Benefit (Z1)	Perceived Risk (Z2)	Trust (Z3)
Fintech (X)					
Loyalty (Y)	0,207				
Perceived Benefit (Z1)	0,961	0,246			
Perceived Risk (Z2)	0,335	0,113	0,262		
Trust (Z3)	0,801	0,284	0,930	0,130	

Discriminant validity was further evaluated using the Heterotrait–Monotrait Ratio (HTMT). As shown in Table 3, all HTMT values are below the conservative threshold of 0.90, ranging between 0.113 and 0.961. This result indicates that each construct is empirically distinct, and the items effectively capture different theoretical concepts (Henseler et al., 2015).

The findings confirm that fintech adoption, perceived benefit, perceived risk, trust, and loyalty are distinct constructs, ensuring that the model exhibits strong discriminant validity. Establishing discriminant validity is essential for structural equation modeling, as it prevents misinterpretation of path relationships and improves the reliability of hypothesis testing (Sarstedt, 2019).

4. Coefficient of Determination (R^2 Test)

The coefficient of determination (R^2) evaluates the explanatory power of exogenous variables on endogenous constructs. Higher R^2 values indicate stronger model fit, with 0.75 categorized as substantial, 0.50 as moderate, and 0.25 as weak (Hair et al., 2019). R^2 is a key criterion in PLS-SEM for assessing the predictive capability of structural models (Hair et al., 2021).

Table: 4 Determination Test

Construct	R^2	R^2 Adjusted
Loyalty (Y)	0.042	0.036

Perceived Benefit (Z1)	0.591	0.588
Perceived Risk (Z2)	0.080	0.074
Trust (Z3)	0.513	0.507

As presented in Table 4, perceived benefit ($R^2 = 0.591$) and trust ($R^2 = 0.513$) achieved moderate explanatory power, suggesting that fintech adoption significantly influences these constructs. Conversely, loyalty ($R^2 = 0.042$) and perceived risk ($R^2 = 0.080$) exhibited weak explanatory power, suggesting that these variables are likely influenced by additional factors not accounted for in the current model.

These results suggest that while fintech adoption and its related constructs account for a significant portion of the variance in perceived benefits and trust, they are insufficient in predicting loyalty and risk perceptions. This aligns with recent fintech research showing that customer loyalty is often influenced by broader elements such as service quality, user experience, and relationship marketing, while contextual factors like regulation and cybersecurity strongly shape risk perception (Nguyen & Hoang, 2024); (Jafri et al., 2024). Hence, further model refinement incorporating such dimensions may enhance predictive accuracy.

5. Path Coefficient Test

The structural model was assessed using path coefficients with the bootstrapping procedure (5,000 resamples), which provides robust estimates even under non-normal data (Hair et al., 2021). Relationships are considered significant when $t > 1.96$ at the 5% level ($p < 0.05$) (Hair et al., 2022). This approach enables testing both direct and indirect effects among fintech adoption, perceived benefit, perceived risk, trust, and loyalty, ensuring reliable hypothesis evaluation (Jafri et al., 2024).
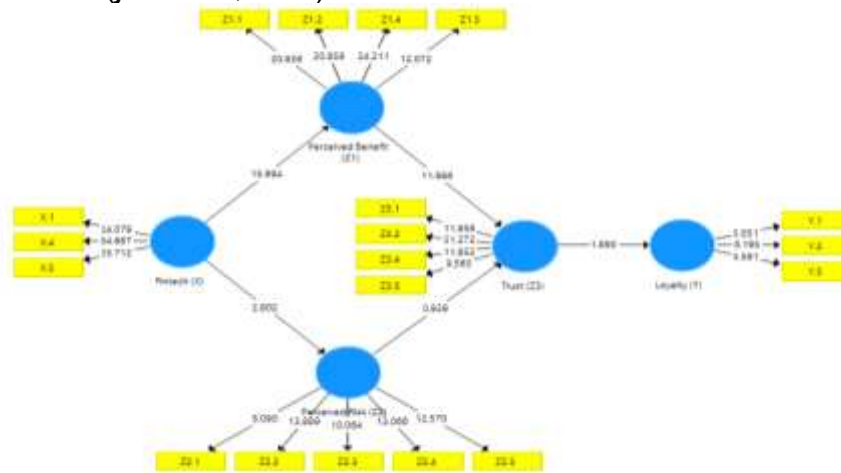

Figure: 2 Output Bootstrapping

6. Direct Effects (Path Coefficients)

The direct effects of fintech adoption, perceived benefit, perceived risk, trust, and loyalty were assessed using PLS-SEM. Table 5 summarizes the coefficients, standard deviations, t-statistics, and p-values. The results of the direct effects are presented in Table 5.

TABLE: 5 Path Coefficient Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Fintech (X) → Perceived Benefit (Z1)	0,769	0,765	0,048	15,994	0,000
Fintech (X) → Perceived Benefit (Z1) → Trust (Z3)	0,283	0,293	0,101	2,802	0,005
Perceived Risk (Z1) → Trust (Z3)	0,729	0,725	0,061	11,986	0,000
Perceived Risk (Z1) → Trust (Z3)	-0,080	-0,084	0,085	0,939	0,348
Trust (Z3) → Loyalty (Y)	0,205	0,225	0,109	1,890	0,059

7. Sub-Structure 1: Effect of Trust on Loyalty

The path from trust (Z3) to loyalty (Y) was positive but not significant ($\beta = 0.205$, $t = 1.890$, $p = 0.059 > 0.05$). Thus, trust alone does not significantly predict customer loyalty, leading to the rejection of H_1. The regression equation is:

$Y = \beta 1.Z_3 + \varepsilon$

$Y = 0{,}205.Z_3 + \varepsilon$

Customer Loyalty $= 0{,}205.$ *Customer Trust* $+ \varepsilon$

This finding suggests that loyalty in fintech services requires additional drivers such as customer satisfaction, service quality, or relational commitment (Nguyen & Hoang, 2024).

6. Sub-Structure 2: Perceived Benefit and Perceived Risk → Trust

a. Perceived benefit had a strong, significant positive effect on trust ($\beta = 0.729$, $t = 11.986$, $p < 0.001$), confirming that customers perceiving high utility are more likely to place trust in fintech services (D'andria et al., 2021).

b. By contrast, perceived risk had a negative but insignificant effect on trust ($\beta = -0.080$, $t = 0.939$, $p = 0.348 > 0.05$). This indicates that although risks exist, they were not strong enough to diminish trust in this context, echoing findings that regulatory assurance can buffer risk concerns (Skowron et al., 2023).

Thus, the regression equation for Sub-structure 2 is as follows:

$Z3 = \beta_1.Z_1 + \beta_2.Z_2 + \varepsilon$

$Z3 = 0{,}729.Z_1 + -0{,}080.Z_2 + \varepsilon$

Customer Trust $= 0{,}729.$*Perceived Benefit* $-0{,}080.$*Perceived Risk* $+ \varepsilon$

7. Sub-Structure 3: Fintech → Perceived Benefit

Fintech adoption significantly improved perceived benefit ($\beta = 0.769$, $t = 15.994$, $p < 0.001$). This suggests that digital banking services enhance efficiency and convenience, which directly increases perceived value (Nguyen & Hoang, 2024).

Thus, the regression equation for Sub-structure 3 is as follows:

$Z1 = \beta_1.X_1 + \varepsilon$

$Z1 = 0{,}769.X_1 + \varepsilon$

Perceived Benefit $= 0{,}769.$Fintech $+ \varepsilon$

8. Sub-Structure 4: Fintech → Perceived Risk

Fintech also significantly increased perceived risk (β = 0.283, t = 2.802, p = 0.005 < 0.01). This indicates that while fintech adoption brings benefits, it simultaneously raises awareness of potential risks such as data security or privacy concerns (D'andria et al., 2021).

Thus, the regression equation for Sub-structure 3 is as follows:

$Z1 = \beta_2 . X_1 + \varepsilon$

$Z1 = 0{,}283 . X_1 + \varepsilon$

Perceived Benefit$= 0{,}283 . Fintech + \varepsilon$

Overall, the findings reveal a benefit–risk trade-off in fintech adoption. While fintech strongly enhances perceived benefits that foster trust, it also raises risk perceptions that may hinder trust development. Importantly, trust was found to be a mediating factor rather than a direct determinant of loyalty, suggesting that loyalty emerges when fintech services consistently deliver value while mitigating risks (Zhang et al., 2021).

9. Indirect Effects

The structural model also tested the indirect effects of perceived benefit and perceived risk on loyalty through trust as a mediating variable. Table 6 presents the results.

TABLE: 6 Spesific Indirect Effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Perceived Benefit (Z1) → Trust (Z3) → Loyalty (Y)	0,150	0,165	0,081	1,843	0,065
Perceived Benefit (Z1) → Trust (Z3) → Loyalty (Y)	-0,016	-0,019	0,023	0,722	0,470

a. Perceived Benefit → Trust → Loyalty

Perceived benefit exerted a positive but statistically insignificant indirect effect on loyalty via trust (β = 0.150, t = 1.843, p = 0.065 > 0.05). This suggests that while higher perceived benefits may enhance trust, trust alone was insufficient to fully translate these benefits into customer loyalty. Prior studies confirm that trust functions as a conditional mediator, with loyalty more strongly influenced when perceived benefit is reinforced by satisfaction and consistent service quality (Nelwan et al., 2021); (Ayegba et al., 2022).

b. Perceived Risk → Trust → Loyalty

Perceived risk demonstrated a negative and insignificant indirect effect on loyalty through trust (β = –0.016, t = 0.722, p = 0.470 > 0.05). This indicates that while perceived risks can reduce trust, they did not significantly weaken loyalty in this context. Prior literature emphasizes that regulatory support, digital literacy, and service reliability may buffer the adverse impact of risk perceptions on loyalty (Janik et al., 2021).

The findings imply that trust does not fully mediate the relationship between perceived benefit, perceived risk, and loyalty. Instead, loyalty in fintech services seems to require not only trust but also consistent delivery of value and risk mitigation strategies. This aligns with previous studies suggesting that loyalty is better explained through integrated frameworks where trust interacts with satisfaction, perceived usefulness, and institutional assurance (Nelwan et al., 2021); (Wang, 2023).

CONCLUSION

This study examined the influence of fintech on customer loyalty, with trust serving as a mediating variable, considering the roles of perceived benefits and perceived risks. The findings indicate that perceived benefits significantly enhance trust, whereas perceived risks have no significant effect on trust. Moreover, trust does not directly influence loyalty, suggesting that loyalty in digital banking requires more than trust alone. Instead, consistent value creation, reliable service, and effective risk management play a crucial role in fostering long-term customer retention. (Zhang et al., 2021); (Ayegba et al., 2022). The results confirm that fintech adoption creates a benefit–risk trade-off, where perceived benefits drive trust, but risk perceptions may limit the extent to which trust translates into loyalty. (Ishak et al., 2025).

For banking practitioners, efforts should focus on enhancing perceived benefits through personalized services, seamless user experience, and innovative features that reinforce trust. Simultaneously, reducing perceived risks by strengthening cybersecurity, transparency, and regulatory compliance will further support customer confidence. (Zhang et al., 2021); (Ishak et al., 2025). Since trust alone was not sufficient to drive loyalty, banks should integrate loyalty-building strategies such as customer engagement programs, relationship marketing, and continuous digital literacy education. (Ayegba et al., 2022).

For future research, broader studies involving multiple banks and regions are recommended to improve generalizability. Incorporating additional mediating or moderating variables, such as customer satisfaction, digital literacy, or institutional assurance, may also offer deeper insights into the loyalty formation process in fintech ecosystems.

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