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Beyond Traditional Technology Acceptance: The Role of Financial Literature and Risk Awareness in Indonesian Fintech Adoption

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ABSTRAK

Pertumbuhan pesat teknologi finansial (fintech) di Indonesia telah menghadirkan pola adopsi yang unik dan menantang model penerimaan teknologi tradisional. Penelitian ini mengkaji faktor-faktor utama yang memengaruhi adopsi fintech di kalangan mahasiswa Indonesia dengan memperluas Technology Acceptance Model (TAM) melalui penambahan variabel pengaruh sosial, persepsi risiko, literasi keuangan, dan kesadaran risiko. Dengan menggunakan desain penelitian kuantitatif cross-section, dan analisis PLS-SEM, data dari 118 mahasiswa dianalisis. Model yang diperluas ini mampu menjelaskan 68,6% variasi dalam niat adopsi dengan sikap berperan sebagai mediator utama yang menghubungkan persepsi kemanfaatan, kemudahan penggunaan, dan niat berperilaku. Persepsi kemanfaatan merupakan prediktor terkuat terhadap sikap (β=0.475), sementara sikap memiliki pengaruh langsung paling besar terhadap niat (β=0.802). Literasi keuangan berpengaruh signifikan terhadap persepsi kemudahan penggunaan (β=0.232), dan sikap (β=0.237), yang menegaskan pentingnya literasi keuangan dalam adopsi teknologi. Menariknya, kesadaran risiko berpengaruh positif terhadap persepsi kemanfaatan (β=0.266), menunjukkan bahwa individu yang sadar risiko justru dapat lebih menghargai nilai fintech. Temuan ini menyoroti peran mediasi sikap dan pengaruh spesifik bidang dari literasi keuangan. Penelitian ini memberikan wawasan praktis bagi penyedia fintech dan pembuat kebijakan untuk meningkatkan adopsi melalui inisiatif terpadu literasi keuangan dan digital yang disesuaikan dengan konteks masyarakat dan pasar negara berkembang.

ABSTRACT

The rapid rise of financial technology (fintech) in Indonesia has introduced unique adoption patterns that challenge traditional technology acceptance models. This study explores key factors influencing fintech adoption among Indonesian university students by extending the Technology Acceptance Model (TAM) to include social influence, risk perceptions, financial literacy, and risk awareness. Employing a quantitative cross-sectional design and partial least squares structural equation modeling (PLS-SEM), data from 118 students were analyzed. The extended model explains 68.6% of the variance in adoption intention, with attitude acting as a key mediator linking perceived usefulness, ease of use, and behavioral intention. Perceived usefulness is the strongest predictor of attitude (β = 0.475), while attitude has the most substantial direct impact on intention (β = 0.802). Financial literacy significantly influences both perceived ease of use (β = 0.232) and attitude (β = 0.237), underlining its importance in technology adoption. Interestingly, risk awareness positively affects perceived usefulness (β = 0.266), suggesting that risk-aware individuals may better appreciate fintech's value. These findings highlight the mediating role of attitude and the domain-specific impact of financial literacy. The study offers practical insights for fintech providers and policymakers to enhance adoption through integrated financial and digital literacy initiatives tailored to collectivistic and emerging market contexts.

1. INTRODUCTION

The financial technology sector has undergone an unprecedented global transformation and Indonesia has emerged as one of the most dynamic and strategically important fintech markets in Southeast Asia. The COVID-19 pandemic has particularly accelerated fintech adoption, with studies showing significant behavioral shifts toward digital financial services across emerging markets (Daragmeh et al., 2021). Recent analyses indicate that fintech innovations are becoming increasingly critical for sustainable business models and financial inclusion, particularly in developing economies where traditional banking infrastructure remains limited (Pizzi et al., 2021). This remarkable growth trajectory positions Indonesia as a critical laboratory for understanding fintech adoption behaviors in emerging digital economies, especially as fintech firms increasingly focus on sustainable finance practices and high-tech enabled solutions (Kaur et al., 2020).

Despite Indonesia's pivotal role in the global fintech landscape, empirical understanding of the factors driving Indonesian consumers' fintech adoption remains significantly limited and theoretically fragmented. Recent research has revealed that fintech adoption studies remain concentrated in developed markets, with limited focus on Southeast Asian contexts where different socioeconomic and cultural factors may operate (Senyo & Osabutey, 2020). This geographic research bias creates substantial knowledge gaps given that emerging markets like Indonesia exhibit fundamentally different infrastructures and adoption patterns, as evidenced by studies showing distinct fintech diffusion patterns in Sub-Saharan Africa and other developing regions (Coffie et al., 2021).

More critically, recent empirical studies demonstrate that traditional Western-centric models, particularly the Technology Acceptance Model (TAM), require significant modifications when applied to emerging market contexts. Al-Saedi et al. (2020) developed an extended UTAUT model specifically for mobile payment adoption, highlighting the need for context-specific theoretical frameworks. Studies examining internet banking and mobile payment services show that cultural moderators significantly influence technology acceptance patterns, suggesting that established models may inadequately capture adoption dynamics in culturally distinct economies (Raza et al., 2020). This substantial theoretical gap indicates that conventional technology acceptance theories require substantial adaptation for emerging market applications.

Indonesia presents particularly distinctive characteristics that fundamentally challenge traditional technology acceptance assumptions. Research on cultural factors in technology adoption reveals that collectivistic societies demonstrate significantly different adoption patterns compared to individualistic cultures, with social influence playing a more prominent role in decision-making processes (Zhang et al., 2022). Recent studies examining mobile banking adoption across different cultural contexts confirm that cultural moderators significantly impact technology acceptance, with collectivistic societies showing stronger reliance on social recommendations and peer influences (Al-Saedi et al., 2020). Furthermore, emerging market studies demonstrate that uncertainty avoidance cultural dimensions create unique risk perception patterns that may paradoxically enhance rather than inhibit technology adoption under certain conditions (Raza et al., 2020).

Furthermore, Indonesia's cultural characteristics suggest heightened sensitivity to perceived risks associated with financial technologies, yet recent behavioral studies present paradoxical findings. While conventional wisdom

suggests that risk-averse consumers would be slower to adopt new financial technologies, empirical evidence from emerging markets shows more complex relationships between risk perceptions and adoption intentions (Al-Saedi et al., 2020). Studies examining fintech payment services reveal that risk awareness may actually enhance adoption intentions in certain contexts, possibly reflecting informed decision-making rather than risk avoidance (Daragmeh et al., 2021). This creates a "risk-adoption paradox" that traditional risk-aversion models cannot adequately explain and requires new theoretical frameworks to understand.

The role of social influence in financial technology adoption represents a particularly significant research gap with substantial theoretical and practical implications. While social influence has been recognized as important in technology acceptance models, its specific mechanisms in financial technology adoption remain critically understudied, particularly in collectivistic cultural contexts (Shareef et al., 2018). Recent studies have begun to examine social factors in mobile banking adoption, but comprehensive understanding of how social influence operates across different adoption stages remains limited (Shareef et al., 2018). Research examining mobile payment and banking services suggests that social influence may operate through distinct cultural channels, yet quantitative research examining these relationships in Southeast Asian contexts remains extremely limited (Tam & Oliveira, 2017).

This research gap is particularly pronounced in Southeast Asian contexts, where social influence mechanisms may operate through distinct cultural channels including family authority structures, peer recommendation networks, and community-based trust systems. Advanced modeling approaches using SEM-neural networks have begun to identify antecedents of mobile commerce acceptance, revealing complex interaction effects between social and individual factors (Liébana-Cabanillas et al., 2021). However, research specifically examining how these social influence mechanisms operate in Indonesian fintech adoption contexts remains extremely limited, despite evidence suggesting their critical importance in collectivistic societies (Al-Saedi et al., 2020).

Existing literature presents fundamentally contradictory findings regarding risk perceptions and fintech adoption, creating substantial theoretical confusion and practical uncertainty. Traditional risk-adoption models predict negative relationships between perceived risks and adoption intentions, yet recent empirical studies from emerging markets report conflicting results. Research on mobile payment adoption reveals complex relationships between different types of perceived risks and adoption intentions, with some risk factors showing positive rather than negative effects (Al-Saedi et al., 2020). Studies examining internet banking services show that risk perceptions may be moderated by service quality perceptions and customer satisfaction factors, further complicating the risk-adoption relationship (Raza et al., 2020).

These contradictory findings are particularly pronounced regarding security risk perceptions. While some technology acceptance studies suggest negative security risk effects, emerging research on fintech payment systems reveals that security awareness may actually enhance adoption intentions, particularly during crisis periods such as the COVID-19 pandemic (Daragmeh et al., 2021). This empirical inconsistency suggests that risk perception mechanisms may operate differently across cultural and economic contexts, with security consciousness potentially reflecting informed decision-making rather than risk avoidance in certain populations (Al-Saedi et al., 2020). However, comprehensive theoretical

explanations for these variations remain underdeveloped, particularly in Southeast Asian contexts.

This study addresses these critical research gaps through three primary contributions that advance both theoretical understanding and practical applications. First, it provides comprehensive empirical examination of fintech adoption drivers specifically within the Indonesian context, addressing the significant geographic research bias in existing literature that has focused primarily on developed markets (Senyo & Osabutey, 2020). Given Indonesia's position as Southeast Asia's largest economy and most populous nation, understanding Indonesian adoption patterns provides crucial insights for the broader emerging market context, particularly as fintech innovations become increasingly important for financial inclusion (Kaur et al., 2020).

Second, this research extends technology acceptance theory by systematically examining the boundary conditions of established Western-centric models in collectivistic, high uncertainty avoidance cultural contexts. By integrating social influence theory with traditional TAM constructs, this study develops a more culturally-sensitive theoretical framework that better captures adoption dynamics in emerging markets, building on recent work that has demonstrated the need for extended models incorporating cultural moderators (Al-Saedi et al., 2020).

Third, this study resolves existing theoretical contradictions regarding risk perception effects by examining multiple risk dimensions (financial, privacy, security) simultaneously within a single comprehensive model. This multidimensional approach enables more nuanced understanding of how different risk types may exhibit varying effects on adoption intentions, particularly in emerging market contexts where risk perceptions may operate differently than in developed economies (Raza et al., 2020; Daragmeh et al., 2021).

The research objectives are threefold: (1) to systematically examine the applicability and explanatory power of traditional TAM constructs in predicting Indonesian fintech adoption, (2) to investigate the specific mechanisms through which social influence and various risk perceptions shape adoption behavior in collectivistic cultural contexts, and (3) to develop and validate a comprehensive theoretical model that better explains fintech adoption patterns in emerging market environments.

The practical significance of this research extends to multiple stakeholder groups. For fintech companies expanding into Southeast Asian markets, the findings provide evidence-based insights for developing culturally-appropriate marketing strategies and product designs that align with local adoption drivers. For policymakers and financial regulators, the research offers data-driven guidance for designing financial inclusion policies that account for cultural factors influencing technology adoption. For financial institutions pursuing digital transformation, the study provides strategic insights for understanding consumer behavior patterns that may differ substantially from developed market assumptions.

This comprehensive investigation thus addresses fundamental theoretical gaps while providing actionable insights for accelerating financial inclusion through culturally-informed fintech adoption strategies in one of the world's most strategically important emerging digital economies.

2. LITERATURE REVIEW

The Technology Acceptance Model, developed by Davis (1989), remains one of the most influential frameworks for understanding technology adoption. TAM proposes that two key beliefs—perceived

usefulness (PU) and perceived ease of use (PEOU)—determine users' attitude toward technology, which subsequently influences intention to use.

Perceived usefulness refers to the degree to which individuals believe that using a particular technology would enhance their performance. Recent studies have continued to validate TAM's effectiveness in the fintech domain. Senyo & Osabutey (2020) demonstrated that perceived usefulness significantly predict mobile payment adoption in emerging markets, while Chatterjee and Bhattacharjee (2020) found perceived usefulness to be particularly relevant for digital banking services in developing economies. Baabdullah et al. (2021) found that mobile banking users in Saudi Arabia adopted such services primarily due to the perceived benefits of enhanced financial convenience and transaction efficiency. H1 is justified because fintech services must demonstrate clear utility to overcome inertia in financial behaviors.

In the fintech context, perceived usefulness may manifest through improved financial management, faster transactions, and better access to financial services. Baabdullah et al. (2021) found that perceived usefulness in mobile banking was strongly associated with enhanced financial convenience and transaction efficiency. Perceived ease of use encompasses the simplicity of interface design, intuitive navigation, and minimal learning requirements. Kelly & Palaniappan (2023) emphasized that user-friendly interfaces are critical for fintech adoption, particularly among users with limited digital literacy. Senyo & Osabutey (2020) further supported this in Ghana, where perceived ease of use reduced anxiety around mobile payments. Therefore, H2 is essential because fintech platforms must minimize complexity to attract a broad user base.

Beyond attitude, PU directly increases intention to use fintech (H3), as users who see clear benefits are more motivated to adopt. Chatterjee & Bhattacharjee (2020) found that Indian consumers adopted digital banking primarily because of its usefulness in avoiding bank queues. Daragmeh et al. (2021) reinforced this in peer-to-peer lending, where PU was the strongest predictor of adoption intention. H3 is critical because even if users have a positive attitude, they will only adopt fintech if they perceive tangible benefits.

Finally, PEOU enhances PU (H4), as intuitive systems make technology seem more valuable. This relationship, first theorized by Venkatesh et al. (2016), was validated in fintech by Islam et al. (2024), who showed that easy-to-use mobile banking apps increased users' perception of usefulness.

However, the effectiveness of TAM in emerging market contexts, particularly for financial technologies that involve monetary transactions and personal data, remains an area of ongoing research. Uddin et al. (2024) noted that while TAM remains relevant, it requires contextual adaptations for financial services in developing countries.

H1: Perceived usefulness positively influences attitude toward fintech adoption.
H2: Perceived ease of use positively influences attitude toward fintech adoption.
H3: Perceived usefulness positively influences intention to use fintech services.
H4: Perceived ease of use positively influences perceived usefulness.

The relationship between risk awareness and perceived usefulness represents a nuanced understanding of how informed users evaluate fintech services. Contrary to the assumption that risk awareness might deter adoption, research suggests that users who better understand potential risks are actually more likely to perceive fintech services as useful. This counterintuitive relationship is supported by the work of Liébana-

Cabanillas et al., (2021) who demonstrated that perceived risk significantly influences trust formation, which subsequently affects adoption intentions. When users are aware of risks, they can make more informed decisions about when and how to use fintech services, leading to more accurate assessments of utility. Liébana-Cabanillas et al. (2021) further emphasize that risk-aware users develop stronger initial trust in mobile payment services, as their understanding of potential threats allows them to better evaluate the security measures and benefits offered by these platforms. This informed evaluation process enhances their perception of the technology's usefulness in addressing their financial needs while maintaining appropriate security standards.

Risk awareness influence perceived ease of use (H5) suggests that users who better understand fintech risks will actually find these technologies more useful. The logic is that risk-aware users can make more informed decisions about when and how to use fintech services, leading them to perceive greater utility when they do choose to adopt them. They're likely to select appropriate services and use them more effectively.

Financial literacy serves as a cognitive foundation that facilitates users' interaction with fintech platforms. Singh, Rafat, and Srivastava (2024) provide compelling evidence that financial literacy has a direct positive relationship with fintech adoption intention, partly through its influence on how users perceive the complexity of these technologies. Individuals with stronger financial knowledge possess existing mental models of financial products, services, and processes, which enable them to more quickly understand and navigate digital financial interfaces. Lusardi & Mitchell (2021) support this based on their research that financially knowledgeable individuals possess cognitive frameworks that allow them to process financial information more efficiently, including digital interfaces. This prior knowledge facilitates quicker comprehension and decision-making when interacting with new financial technologies. The familiarity with financial concepts, terminology, and procedures allows financially literate users to transfer their existing knowledge to digital platforms, making these technologies appear more intuitive and less challenging to use. This relationship is further validated by Thusi and Maduku (2020), who found that users' financial understanding significantly influences their comfort level with retail mobile banking applications. Financial literacy positively influences perceived ease of use (H6) proposes that financially literate individuals will find fintech platforms easier to navigate and understand. Their existing knowledge of financial concepts, products, and processes should help them more quickly grasp how digital financial services work, making the technology seem less complex and more intuitive.

Risk awareness enhances attitude (H7) when users trust the platform's safeguards. Susanto (2020) showed that risk-aware users developed positive attitudes toward fintech when security features were visible. Li et al., (2023) found that risk-conscious consumers in Pakistan had higher trust and thus more favorable attitudes toward regulated fintech services. H8 is vital because it implies that transparency in risk mitigation can convert cautious users into adopters.

Likewise, financial literacy also directly improves attitude (H8), as literate users have fewer misconceptions about fintech. Panos et al., (2020) found that financially knowledgeable users had more positive attitudes toward digital investment tools because they trusted them more. Thomas (2021) similarly linked financial literacy to favorable attitudes in mobile banking. H7 is included because it suggests that attitude formation is not just about technology design but also user competence.

H5: Risk awareness positively influences perceived usefulness.

H6: Financial literacy positively influences perceived ease of use.
H7: Risk awareness positively influences attitude toward fintech adoption.
H8: Financial literacy positively influences attitude toward fintech adoption.

The attitude-intention relationship is well-established in technology acceptance research and a cornerstone of behavioral theories like the Theory of Planned Behavior (Ajzen, 1991). Attitude represents overall evaluative judgment about performing a behavior, while intention reflects the strength of one's motivation to perform the behavior. This relationship has been consistently validated across various technology adoption contexts.

Recent fintech studies have continued to support this relationship. In their study on peer-to-peer lending platforms in Hungary, Daragmeh et al. (2021) confirmed that positive attitudes strongly predict fintech adoption intentions, highlighting attitude as a key determinant in the adoption process. While Islam et al. (2024) found the same in Bangladesh, where favorable attitudes toward mobile banking increased adoption intentions across different demographic groups which are rural and urban users. H9 is fundamental because it connects cognitive evaluations (PU, PEOU) and individual traits (literacy, risk awareness) to actual behavior, closing the loop in the adoption process.

H9: Attitude positively influences intention to use fintech services.

3. METHOD

This study employed a quantitative research approach using cross-sectional survey design. The research model was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is appropriate for exploratory research with complex models and relatively small sample sizes (Hair et al., 2019; Sarstedt et al., 2019). PLS-SEM is particularly suitable for prediction-oriented research and theory development, as it can handle complex models with multiple constructs and indicators while accommodating non-normal data distributions (Ringle et al., 2020).

Data were collected from Indonesian university students who had experience with or knowledge of fintech services. Since this study was conducted in even semester then the target population consisted of Indonesian undergraduate students in UKTS, enrolled in semesters 2, 4, 6, and 8. This stratified sampling approach ensured representation across different academic levels, capturing varying degrees of financial experience and technological familiarity as students progress through their university education (Creswell & Creswell, 2018).

The survey was distributed through online platforms, targeting respondents within the university student population to ensure representativeness. University students represent an ideal population for fintech adoption research as they are digital natives with increasing financial responsibilities and exposure to technological innovations (Venkatesh et al., 2012).

A total of 118 valid responses were obtained after data cleaning and validation procedures. The sample size exceeds the minimum requirements for PLS-SEM analysis, which typically requires 10 times the largest number of structural paths directed at a particular construct (Hair et al., 2019). The distribution across semesters was as follows: Semester 2: 29 respondents (24.6%), Semester 4: 31 respondents (26.3%), Semester 6: 30 respondents (25.4%), Semester 8: 28 respondents (23.7%).

The research model integrates multiple theoretical frameworks including the Technology Acceptance Model (TAM), and Theory of Planned Behavior (TPB) to explain fintech adoption intentions among university students. The model examines

how financial literacy, risk awareness and technology acceptance factors such as perceive usefulness and perceived of ease use collectively influence students' attitudes and intentions toward fintech usage.

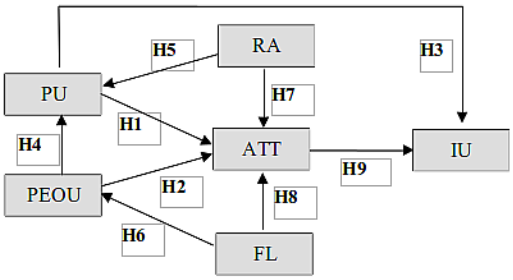

Figure 1. Conceptual Model
Indonesian Student's Fintech Adoption

The conceptual model in Figure 1., illustrates the hypothesized relationships among several constructs influencing students' intention to adopt financial technology (Fintech). At the core of the model are constructs adapted from the Technology Acceptance Model (TAM), namely Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Use (ATT), and Intention to Use (IU). The model is extended by incorporating Financial Literacy (FL) and Risk Awareness (RA) to better reflect the contextual factors relevant to Indonesian students. Specifically, the model proposes that PEOU influences both PU (H4) and ATT (H2), students who perceive fintech as easy to use tend to form a more favorable attitude toward using it and if students find the technology easy to use, they are more likely to perceive it as useful. PU is expected to have a direct positive effect on ATT (H1) since students who see Fintech as useful are more inclined to have a positive attitude toward its use. PU is influenced by FL (H5), since higher financial literacy may improve students' perception of fintech's usefulness. The relationship between PU and IU (H3) suggests that when students perceive fintech as useful in managing their finances, they are more likely to intend to use it. ATT is posited to be a strong predictor of IU (H9), a favorable attitude toward fintech significantly influences the student's intention to adopt it. While FL is also hypothesized to influence ATT directly (H7) since financially literate students tend to have a more positive attitude toward Fintech adoption. RA is introduced as a contextual enabler, predicted to enhance PEOU (H6) and ATT (H8) since risk awareness can make fintech appear easier to use and students with higher risk awareness may develop more positive attitudes toward fintech. Altogether, this model presents a comprehensive framework to explore how cognitive perceptions (PU, PEOU), individual capability (FL and RA) shape students' attitudes and intentions toward adopting fintech services in Indonesia.

All constructs were measured using established scales adapted from previous literature and validated in technology adoption and financial services contexts (Davis, 1989; Ajzen, 1991; Lusardi & Mitchell, 2014). The questionnaire was developed in Bahasa Indonesia. All items were measured using 7-point Likert scales ranging from 1 (strongly disagree) to 7 (strongly agree), following established practices in technology acceptance research (Hair et al., 2019).

Data analysis in this study followed the two-stage Partial Least Squares Structural Equation Modeling (PLS-SEM) approach as recommended by Hair et al. (2019), beginning with the evaluation of the measurement model (outer model), followed by the assessment of the

structural model (inner model). All statistical analyses were conducted using SmartPLS 4.0, a software tool chosen for its robust ability to handle complex model structures and accommodate data that may not follow a normal distribution (Ringle et al., 2020).

The measurement model evaluation focused on assessing the reliability and validity of the constructs. Internal consistency reliability was examined through Cronbach's alpha and composite reliability (CR), with both values expected to exceed the threshold of 0.70. Convergent validity was assessed using the Average Variance Extracted (AVE), where values above 0.50 indicated acceptable levels. Discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) ratio, applying a cut-off of 0.85 for conceptually similar constructs and 0.90 for conceptually distinct ones. Additionally, indicator reliability was verified by ensuring that all outer loadings met or exceeded the standard threshold of 0.70.

Following the confirmation of measurement quality, the structural model assessment was conducted. Path coefficients and their significance levels were determined using a bootstrapping procedure with 5,000 subsamples. The coefficient of determination (R^2) was calculated to assess the model's explanatory power for each endogenous construct. Effect sizes (f^2) were examined to evaluate the practical significance of each relationship in the model. Predictive relevance (Q^2) was assessed using blindfolding procedures to determine the model's out-of-sample predictive accuracy. Lastly, the overall goodness-of-fit was evaluated using the Standardized Root Mean Square Residual (SRMR), with values below 0.08 indicating an acceptable model fit.Berisi bagaimana data dikumpulkan, sumber data dan cara analisis data

4. RESULT AND DISCUSSION

Descriptive The evaluation of the measurement model revealed satisfactory psychometric properties for the all of constructs examined in this study (Table 1). The reliability assessment demonstrated robust internal consistency, with Cronbach's alpha and composite reliability values exceeding the recommended threshold of 0.7 for most constructs (Hair et al., 2019). As shown in Table 1, all the constructs exhibited excellent reliability indicators since Alpha > 0.7, rhoC > 0.7, rhoA > 0.7 and AVE > 0.5 with Financial Literature (FL) has the highest AVE (0.848). HTMT (Heterotrait-Monotrait Ratio) between constructs < 0.90, indicating no multicollinearity or ambiguity problems between constructs. The highest R^2 value is owned by IU (Intention to Use) of 0.686, as presented in Table 2., meaning that the model is quite good at explaining the variability of IU (68.6%). The R^2 values for PU and PEOU are still low, indicating that there are still many other variables that have not been captured in the model.

Table 1. Reliability and Coverget Validity

Construct	Cronbach's Alpha	RhoC	AVE	RhoA	Status
FL	0.910	0.944	0.848	0.928	Reliable
PU	0.936	0.950	0.761	0.946	Reliable
PEOU	0.859	0.896	0.593	0.892	Reliable
RA	0.897	0.819	0.659	0.960	Reliable
ATT	0.900	0.925	0.674	0.910	Reliable
IU	0.928	0.944	0.738	0.937	Reliable

Table 2. R^2 (Coefficient of Determinant)

Construct	R^2	Adj. R^2	Level of Explanation
ATT	0.400	0.348	Moderate
PU	0.077	0.053	Weak
PEOU	0.054	0.038	Weak
IU	0.686	0.678	Substantial

Table 3. Path Coefficients and Hypothesis Testing

Hypo-thesis	Path	β(Ori-ginal)	T-Stat	Support-ed ?
H1	PU-ATT	0.475	7.600	Yes
H2	PEOU-ATT	0.294	3.953	Yes
H3	PU-IU	0.006	0.106	No
H4	PEOU-PU	-0.058	-0.655	No
H5	RA-PU	0.266	3.754	Yes
H6	FL-PEOU	0.232	2.587	Yes
H7	RA-ATT	-0.029	-0.396	No
H8	FL-ATT	0.237	2.843	Yes
H9	ATT-IU	0.802	17.202	Yes

The analysis revealed four critical insights: (1) Attitude emerged as the strongest direct predictor of Intention to Use (β = 0.802), underscoring its central role in adoption decisions; (2) while perceived usefulness and perceived ease of use significantly influenced Attitude, their effects on Intention to Use were fully mediated, demonstrating attitude's pivotal position in the acceptance process; (3) Financial Literacy played a dual foundational role, directly shaping both perceived ease of use and attitude, suggesting that financially knowledgeable users better appreciate the technology's usability and develop more favorable dispositions; and (4) counterintuitively, risk attitude positively affected perceived usefulness, implying that risk-aware users may perceive greater utility in technologies that address their specific concerns, a finding that challenges conventional assumptions about risk perceptions in technology adoption.

The findings of this study provide substantial empirical support for the Technology Acceptance Model (TAM) framework within the context of financial technology adoption, while also revealing important nuances in the theoretical relationships. Our SEM-PLS analysis demonstrates that the model successfully explains 68.6% of the variance in intention to use FinTech services, which exceeds the typical explanatory power of TAM applications reported in previous literature (Legris et al., 2003). This robust explanatory power suggests that the integrated model effectively captures the key determinants of FinTech adoption behavior.

The central role of attitude as a

mediator between perceived usefulness, perceived ease of use, and intention to use aligns with the foundational TAM principles (Davis, 1989). Our findings corroborate recent studies by Amnas et al. (2024), who found that attitude serves as a critical mediator in digital financial service adoption. The path coefficient of 0.802 from attitude to intention to use represents one of the strongest relationships observed in the model, reinforcing the theoretical proposition that favorable attitudes are prerequisite for technology adoption intentions.

Particularly noteworthy is the finding that perceived usefulness (β = 0.475, $p < 0.001$) exerts a stronger direct influence on attitude than perceived ease of use (β = 0.294, $p < 0.001$). This result supports the theoretical assertion that usefulness perceptions typically outweigh ease of use considerations in technology adoption decisions (Venkatesh & Davis, 2000). The relative importance of perceived usefulness over perceived ease of use has been consistently documented in FinTech adoption studies, suggesting that users prioritize functional benefits over operational simplicity when evaluating financial technologies (Senyo & Osabutey, 2020).

A notable contribution of this study is the identification of financial literacy as a significant predictor of both attitude (β = 0.237, $p < 0.01$) and perceived ease of use (β = 0.232, $p < 0.05$). This finding extends traditional TAM by incorporating domain-specific knowledge as an antecedent factor. The link between financial literacy and financial well-being is rooted in the idea that individuals with financial knowledge are more likely to access financial services, engage in positive financial behaviors, and achieve higher financial well-being (Fan & Henager, 2022; Lusardi & Streeter, 2023), which supports our finding that financial literacy serves as a foundation for technology acceptance in financial contexts.

The role of financial literacy in enhancing perceived ease of use suggests that individuals with better financial knowledge find digital financial technologies less intimidating and more accessible (Amnas et al., 2024). This finding has important implications for digital financial inclusion initiatives, as it indicates that digital literacy and technology adoption on financial inclusion are interconnected processes that require coordinated intervention strategies (Senyo & Osabutey, 2020; Guo & Peng, 2024).

Furthermore, the total effect analysis reveals that financial literacy has an indirect effect of 0.255 on intention to use through its influence on attitude, demonstrating the importance of financial education in promoting technology adoption (Baistaman et al., 2020). This finding aligns with research showing that FinTech positively impacts financial inclusion, making it easier for individuals to get into formal financial services, though the mechanism appears to work through enhanced financial literacy enabling better attitude formation (Amnas et al., 2024).

The positive relationship between risk attitude and perceived usefulness (β = 0.266, $p < 0.001$) provides interesting insights into the behavioral finance aspects of technology adoption. This finding suggests that individuals with higher risk tolerance are more likely to perceive digital financial technologies as useful (Weber et al., 2002), possibly because they are more willing to explore and experiment with new financial tools. Research on perceived risk determinants affecting intention to use

fintech shows that perceived risk hinders fintech adoption (Li et al., 2023), which contextualizes our finding by demonstrating the importance of risk-related factors in fintech adoption decisions.

The significant effect of risk attitude on perceived usefulness, while not directly affecting attitude, suggests that risk tolerance influences the cognitive evaluation of technology benefits (Appiah & Agblewornu, 2025). This finding contributes to the behavioral finance literature by demonstrating how individual risk preferences shape technology perception, which ultimately influences adoption decisions through the attitude formation process (Venkatesh et al., 2003).

Interestingly, risk attitude did not directly influence attitude ($\beta = -0.029$, $p > 0.05$), suggesting that risk tolerance affects technology adoption primarily through its impact on utility perception rather than through direct attitude formation. This pattern indicates that risk-tolerant individuals may be more likely to recognize the benefits of digital financial technologies, but their overall attitude toward these technologies is shaped by other factors, particularly perceived usefulness and ease of use (Davis, 1989).

The model demonstrates excellent predictive validity with substantial explained variance in intention to use ($R^2 = 0.686$), indicating that the proposed model captures the key factors driving digital financial technology adoption (Hair et al., 2019). However, the relatively low explained variance in perceived usefulness ($R^2 = 0.073$) and perceived ease of use ($R^2 = 0.054$) suggests that additional antecedent factors need to be incorporated to better understand the formation of these key TAM constructs (Amnas et al., 2023).

The reliability and validity measures all exceed recommended thresholds, with Cronbach's alpha values ranging from 0.859 to 0.936 and composite reliability values from 0.896 to 0.950. The Average Variance Extracted (AVE) values, ranging from 0.593 to 0.848, demonstrate adequate to excellent convergent validity. The HTMT criterion values below 0.90 confirm discriminant validity, with the highest value of 0.899 between attitude and intention to use, which is acceptable given their strong theoretical relationship.

From a theoretical perspective, this study makes several important contributions to the technology acceptance literature. First, it demonstrates the complete mediation role of attitude in the relationship between core TAM constructs and behavioral intention in the digital financial services context (Venkatesh et al., 2012). This finding suggests that the formation of positive attitudes is the critical pathway through which perceived benefits and ease of use translate into adoption intentions.

Second, the study extends TAM by incorporating financial literacy as a domain-specific antecedent that influences both attitude formation and ease of use perception (Amnas et al., 2024). This extension is particularly relevant for digital financial services, where domain knowledge plays a crucial role in technology evaluation and adoption decisions. Recent research on the impact of financial literacy on women's economic empowerment through digital financial services supports this extension by demonstrating the mediating role of digital financial services in translating financial knowledge into economic outcomes.

Third, the inclusion of risk attitude as a behavioral factor influencing perceived

usefulness adds a behavioral finance dimension to technology acceptance research (Weber et al., 2002). This integration provides a more nuanced understanding of how individual differences in risk tolerance shape technology perception and adoption decisions.

From a practical perspective, the findings offer valuable insights for digital financial service providers and policymakers. The central role of attitude suggests that marketing and educational initiatives should focus on shaping positive attitudes toward digital financial technologies rather than solely emphasizing functional features (Davis, 1989). The significant role of financial literacy indicates that financial education programs could be an effective strategy for promoting digital financial inclusion (Khan et al., 2022).

Despite its contributions, this study has several limitations that present opportunities for future research. First, the cross-sectional design limits causal inferences, and longitudinal studies would provide stronger evidence for the proposed relationships (Creswell & Creswell, 2018). Future research could employ panel data to examine how the relationships between constructs evolve over time and to establish clearer causal pathways.

Second, the relatively low explained variance in perceived usefulness and perceived ease of use suggests that important antecedent factors are missing from the model. Recent research integrating UTAUT2 with trust theoretic models suggests that factors such as trust, social influence, and facilitating conditions could be important additions to the model (Amnas et al., 2023). Future research could explore additional antecedents such as social influence, trust, perceived security, and technological self-efficacy.

Third, the study was conducted in a specific cultural and economic context, which may limit the generalizability of findings (Guo & Peng, 2024). Cross-cultural studies would help determine whether the observed relationships hold across different cultural and economic environments. Research on bridging the digital divide and understanding determinants of FinTech adoption in rural communities highlights the importance of contextual factors in technology adoption.

Fourth, the study focused on intention to use rather than actual usage behavior (Venkatesh et al., 2012). Future research could extend the model to include actual usage behavior and examine the factors that influence the translation of intentions into actions. Additionally, investigating the moderating effects of demographic variables, technological experience, and situational factors could provide deeper insights into the conditions under which the proposed relationships are stronger or weaker.

5. CONCLUSION AND POLICY IMPLICATION

This study provides robust empirical support for an extended Technology Acceptance Model in the context of digital financial services adoption. The findings demonstrate that attitude plays a central mediating role in translating perceived benefits and ease of use into adoption intentions, explaining 68.6% of the variance in behavioral intention. The study makes important theoretical contributions by identifying financial literacy as a critical antecedent that influences both attitude formation and perceived ease of use, and by demonstrating how risk attitude shapes the perception of technology usefulness.

The practical implications suggest that digital financial service providers

should focus on attitude formation through comprehensive educational initiatives that enhance both financial literacy and technology awareness. Policymakers should consider integrated approaches that combine financial education with digital literacy programs to promote inclusive access to digital financial services.

Future research should address the identified limitations through several avenues. First, longitudinal studies are needed to establish stronger causal relationships and to understand how technology acceptance evolves over time. Second, researchers should explore additional antecedent factors, particularly those related to trust, social influence, and contextual facilitating conditions, to better explain the formation of perceived usefulness and ease of use.

Third, cross-cultural validation studies would enhance the generalizability of findings and help identify cultural factors that moderate the proposed relationships. Fourth, studies examining the intention-behavior gap in digital financial services adoption would provide valuable insights into the factors that facilitate or hinder the translation of adoption intentions into actual usage behavior.

Fifth, investigation of moderating factors such as age, gender, income level, and technological experience could provide more nuanced understanding of individual differences in technology adoption processes. Finally, qualitative studies could provide deeper insights into the cognitive and emotional processes underlying attitude formation and decision-making in digital financial technology adoption.

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