

A Structural Equation Model of Digital Financial Literacy, Risk Awareness, and Security Behavior in Mobile Wallet Adoption.

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ABSTRACT

The fast development of mobile wallets has changed the digital financial sphere, but the level of their adoption is not even since most users still have some doubts about safety, riskiness, and the degree of digital literacy. This paper forms and estimates a full Structural Equation Model (SEM) to investigate the interactive effects of digital financial literacy and risk awareness on security behavior and, finally, mobile wallet adoption. The study is based on the knowledge of Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and behavioral finance, hypothesising that digital financial literacy improves the security practices of the users directly, as well as increases the impact of risk awareness on the protective behaviours. Based on primary survey data of digital payment users and analyzed with SEM, it can be concluded that both digital financial literacy and risk awareness have a strong impact on the security behavior of users, i.e. the level of utilization of biometric authentication, monitoring transactions, and avoiding fraud, which, in turn, has a positive effect on the intention and actual use of digital payment. The role of trust is also a key moderator, which reduces the perceived risks and instills greater confidence in mobile wallet systems. The research highlights that access to technology is not enough but good adoption should be followed by knowledge and awareness of the users to navigate digital financial landscapes safely. This research has practical implications to fintech developers, financial institutions, and policymakers: digital financial literacy promotion, improved risk disclosure, and built-in strong security are the key measures to be taken to encourage safe and inclusive use of mobile wallets.....

Keywords: Financial Literacy, Fintech Developers, Financial Institutions, And Policymakers...

INTRODUCTION

The fast-growing utilization of mobile wallets and online financial services has brought about a major change to the overall financial landscape of the world as mobile wallets and digital financial services provide users with more than ever before in terms of convenience, speed, and ease of access in handling their finances (Hossain 2019). These technologies have facilitated daily transactions, in addition to increasing financial inclusion, especially in emerging markets where the banking system is still insufficient (Ragasa 2025). They have been made possible through a breakthrough in both the penetration of smartphones and internet connectivity, but they have also boiled down the process of conducting business daily as well as enhanced financial inclusion, especially in emerging economies where the conventional banking systems are still wanting (Wei et al. 2025). Even with these benefits, adoption is still very uneven because users still face a number of challenges that include security issues, disjointed user experiences, and different levels of

digital and financial literacy (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025).

An emerging literature highlights the fact that the mere availability of technology is not enough to lead to continued adoption, and instead, users should have cognitive and behavioral skills to navigate digital financial conditions safely and efficiently (Dogan Basar, Halit Keskin, Emel Esen, Abdullah Kursat Merter 2025). Digital financial literacy, meaning a complex of financial literacy and digital skills to use fintech platforms in a responsible manner, has become an important facilitator of a secure and informed use in this context (Wei et al. 2025). At the same time, the risk awareness, or the perception that the user has of a potential threat, such as fraud, data breach, and identity theft, is a key determinant of protective behaviors, like a biometric authentication, or a history of transactions (Hossain 2019).

Trust is a very important mediating process in this ecosystem. The literature is also consistent in finding that trust reduces the perceived risk and enhances the

beneficial impact of digital literacy and ease of use on adoption intention (Bhuvana and Vasantha 2017; Mittal and Sharma 2025; Ragasa 2025). In addition, empirical data indicate that more digitally financially literate users prefer to take proactive security measures, and such a behavior strengthens their confidence and readiness to use mobile wallets (Sadik and Rahman 2024). Nonetheless, the relationship between digital financial literacy, risk awareness, and real security behavior is not explored in a comprehensive manner, especially using the rigorous quantitative approach, e.g., Structural Equation Modeling (SEM).

The paper bridges this gap by developing and evaluating an integrated SEM model exploring the joint effect of digital financial literacy and risk awareness on security behavior and, finally, mobile wallet adoption. The study utilizes some of the earliest theories including the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which include trust as a mediator and contextualizes the findings in the context of the dynamic fintech environment with different user groups (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025; Ragasa 2025). The study will offer practical solutions to the fintech developers, financial institutions, and policymakers who want to support secure, inclusive, and sustainable digital finance ecosystems by empirically validating these relationships.

Literature Review:

The growth of mobile wallets has revolutionized the banking sector, especially in developing and emerging markets where banking infrastructure is weak. Mobile wallets provide convenience, financial inclusion and transactional speed, but are often the subject of user-level cognitive and behavioural considerations. These include digital financial literacy (DFL), risk perception, and security practices, which have been identified as key factors in safe mobile wallet adoption. While empirical research interest has grown, the relationships between these have been under-theorized, and have rarely been integrated into a single structural equation model (SEM). This review of the literature integrates recent research on mobile wallet adoption, DFL, risk awareness and security behavior, assesses the methodological fit of SEM for testing intricate behavioral relationships, discusses theoretical and empirical limitations, and proposes avenues for future work.

Theories and Evidence of Mobile Wallet Adoption

Theoretically, mobile wallet adoption is largely studied using well-developed technology acceptance models, such as the Technology Acceptance Model, the Unified Theory of Acceptance and Use of Technology and Diffusion of Innovation. Perceived usefulness, ease of use, social influence and facilitating conditions are consistently found to be key factors driving initial adoption intention in empirical research. But emerging evidence indicates a focus on post-adoption, including the importance of trust, perceived security, and ongoing use (Wei et al. 2025).

Adoption barriers continue to be linked to trust, security

and privacy, especially among initial adopters and the elderly. The literature also highlights contextual differences: in markets with high smartphone but low formal financial literacy, Fintech usage is more likely to be driven by convenience, rather than choice (Demirg et al. 2021). This highlights the need to consider user competency and risk perception in adoption frameworks.

Digital Financial Literacy: Definition and Fintech Adoption

Digital financial literacy builds on financial literacy to include the knowledge, skills, attitudes and practices needed to safely and effectively access digital financial products. It encompasses knowledge of digital transaction processes, fraud and phishing schemes, managing credentials and passwords, and interpreting terms and conditions and data privacy policies (ALONZO et al. 2025).

Research evidence suggests that DFL is positively associated with the use of fintech, better-informed financial decision-making, and lower levels of digital financial fraud (Dubey and Gupta 2024). In mobile wallets, DFL moderates the link between perceived risk and adoption intentions, as financially literate individuals can more easily evaluate platform security and adopt risk mitigation strategies (Amri, Mohammed, and Bekiroglu 2026). But DFL assessment is scattered across research, with scales often modified from traditional financial literacy measures, failing to incorporate digital-specific skills (Demirg et al. 2021). Recent recommendations highlight context-specific, behavior-focused DFL measures that assess cognitive knowledge and digital security skills.

Risk Perception and Awareness in Mobile Payment Systems

Risk awareness is the cognitive awareness of potential risks of a technology, as opposed to perceived risk, which includes the subjective assessment of likelihood and severity of the threats. Within mobile wallet ecosystems, common risk awareness concerns include the risk of financial losses, privacy concerns, identity theft, and system stability (ALONZO et al. 2025).

Risk awareness plays a two-fold role in the literature. Generally, when risk awareness is high, it can discourage adoption, especially if individuals lack trust in their ability to manage risks (Tamrakar and Lakra 2025). However, when combined with sufficient DFL, risk awareness can prompt security-related activities, converting threat perceptions into action. Research based on Protection Motivation Theory (Dubey and Gupta 2024) and the Health Belief Model adapted for cybersecurity applications shows risk awareness affects threat appraisal, which then affects coping responses like using two-factor authentication and reviewing transaction history (Dogan Basar, Halit Keskin, Emel Esen, Abdullah Kursat Merter 2025). However, risk awareness is not often explicitly modeled in studies on mobile payment adoption, often conflated with perceived risk or trust, and lacks explicit consideration in models.

Security Behavior: User Behavior and Protective Action

Security behavior in the context of mobile wallets refers to a range of proactive user actions to safeguard their wallets, such as creating a secure password, using biometric lock, updating the app, reviewing transactions, and detecting phishing scams (Amri et al. 2026). In contrast to technological security features, user security behavior is a reflection of user agency and is shaped by perceived efficacy, risk perception, and digital literacy (Dubey and Gupta 2024).

Research suggests that security behavior plays a moderating role between risk perception and mobile wallet adoption (Wei et al. 2025). Those who perceive risks but fail to take action or lack the technical ability to do so often abandon the wallet or fall victim to fraud, while those who have secure practices, such as enabling security features, report greater satisfaction and trust (Ritu, 2024). Crucially, security behavior is dynamic and can change through experience, platform interactions, and training (Dubey and Gupta 2024). Recent studies on cybersecurity behavior stress the importance of habit formation and user interface design in promoting security practices, indicating that adoption models should consider both cognitive and behavioral factors (ALONZO et al. 2025).

The introduction of mobile wallets and digital financial services has received a considerable amount of scholarly attention because of the transformative potential held by the aspect of fostering financial inclusiveness, increasing transactional efficiency, and changing the consumer behavior. An increasing literature bases its arguments on the established theories of technology acceptance, specifically, the Technology Acceptance Model (TAM) (Ananta and Juita 2026) and the Unified Theory of Acceptance and Use of Technology, (UTAUT) (Hossain 2019). The perceived usefulness, perceived ease of use, social influence as well as facilitating conditions always emerge in these frameworks as important antecedents of adoption.

Nonetheless, recent research points out to the fact that technological functionality does not ensure long-term usage. Trust has become a key mediating construct that interminates perceived risk and intention to adopt it. (Mittal and Sharma 2025) show that trust plays an important role in mediating the relationship between the risk perception and the adoption of fintech, which alleviates the fear of fraud, data breaches, and failure of the system. Equally, (Ragasa 2025) establishes that trust has a direct positive effect on the behavioral intention, as well as moderates the impact performance expectancy, habit, and digital financial literacy on the use of mobile money in the Philippines. (Bhuvana and Vasantha 2017) affirm that trust has a positive influence in the attitude of users towards mobile banking, which supports its use in different socioeconomic settings.

Similarly, the digital financial literacy, which is a collection of financial literacy and digital proficiency, has become a major staple of harmless and effective fintech engagement. (Dogan Basar, Halit Keskin, Emel Esen, Abdullah Kursat Merter 2025) report the results of a cross-country research on over 30,000 individuals in 12 countries that reveal that it is only through appropriate

financial literacy that fintech use substantially increases savings behavior. They identify a threshold effect: below a particular literacy, digital tools have not resulted in a significant amount in terms of financial returns. This is consistent with the research conducted by (Wei et al. 2025): in their case, they state that perceived ease of use to fintech adoption is mediated by digital literacy and highly digitally competent users perceive platforms as easier to use and more credible.

Risk awareness is a concept that distinguishes the risk perception in general and is known as the conscious awareness of users about cybersecurity threats and safeguard. According to (Ragasa 2025), behavioral intention is positively correlated with the awareness of the digital financial threat, which plays to the effect that when the user develops awareness of the threats, the tendency to adopt mobile money more frequently increases. This is unlike the traditional perceptions, which are characterized by the traditional concepts of only risk as a hindrance but hypothesize that risk awareness is empowering when it is coupled with literacy and trust.

The interplay of these constructs is also made difficult by the contextual factors. Such challenges as disunity of platforms, prior challenges in integrating banking and asymmetric digital infrastructure, particularly in new markets are noted by (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025). Meanwhile, the variables of national level, including quality of laws, digital identity, and cultural norms, which mediate the effectiveness of fintech to improve financial performance, are highlighted by the authors (Sadik and Rahman 2024). As an example, the beneficial relationships between the utilisation of fintech and savings are reinforced by suitable regulations, especially in rapidly expanding economies. (Nikita and Bakarali 2025)

Despite their making, few studies have integrated digital financial literacy, risk awareness, trust, and security behavior into a framework structure that is unbroken. Most of the literature that is available examines these variables individually or gives a scanty attention to their adoption intention and ignores the practical security practices (i.e. biometric authentication, transaction monitoring). Moreover, models of the influence of literacy and risk awareness on the formation of the security behavior group have been justified with the assistance of SEM (Bhuvana and Vasantha 2017; Mittal and Sharma 2025), the interaction between literacy and risk awareness on the formation of the security behavior has not been modeled yet, which is a direct proximal outcome directly influencing the long-term adoption and safety on the platform.

Structural Equation Modeling: Appropriate Analysis and Previous Use

Structural equation modeling (SEM) is the preferred analytical technique in technology acceptance and behavioral finance studies because it allows for simultaneous estimation of measurement models and structural pathways, accommodation of latent constructs, and testing of mediation and moderation processes (Fikri et al. 2025). SEM is an ideal approach to test the proposed

model of DFL, risk awareness, security behavior and mobile wallet adoption for a number of reasons:

Multidimensional Latent Constructs: DFL, risk awareness and security behavior are latent and multi-dimensional. SEM's confirmatory factor analysis (CFA) confirms construct validity and reliability prior to path testing (Dubey and Gupta 2024).

Testing Mediation and Moderation: SEM explicitly tests indirect effects (e.g., DFL → risk awareness → security behavior → adoption) and moderation (e.g., DFL moderates the link between risk and behavior) with bootstrapping and multi-group analysis (ALONZO et al. 2025).

Model Fit Indices: Global fit (CFI, TLI, RMSEA, SRMR) rigorously evaluates a theory's fit, allowing researchers to refine pathways based on empirical evidence (Wei et al. 2025).

Previous Use: SEM has been used to examine fintech adoption, whereby extended UTAUT, trust-risk-adoption and cybersecurity behavior models have been validated (Amri et al. 2026). Yet, few studies provide an integrated SEM model of DFL, risk perception and cybersecurity behavior - a gap in theory and method.

The research reveals that mobile wallet usage is not only related to technology usefulness but also to financial cognitive, risk awareness, and security practices. DFL offers the necessary skill, risk awareness triggers threat appraisal, and security behavior transforms perception into behavior. Despite this logical flow, current research is plagued by a number of issues:

Theoretical Ambiguity: DFL, risk awareness and security behavior are frequently studied in isolation or combined with other variables such as trust or perceived risk.

Incoherent Measurement: DFL measures often lack digital security skills; risk awareness is seldom separated from perceived risk; security behavior is often self-reported and not behaviorally validated.

Limited Context: SEM research typically applies to developed economies or individual countries, restricting cross-cultural applicability and policymaking.

Static Design: SEM designs are mostly cross-sectional, overlooking longitudinal monitoring of literacy evolution, risk habituation and security behavior dynamics.

Future studies should use multi-group SEM to compare user adoption across demographics and countries (including regulatory regimes). Combining objective measures of security (e.g., system logs, phishing simulations) with survey-based measures of DFL and risk perceptions will increase the ecological validity. Likewise, experimental or quasi-experimental studies on financial education could reveal causal links in SEM models.

Mobile wallet adoption and continued usage depend on complex interactions between digital financial literacy, perceived risk and cybersecurity practices. Structural equation modeling provides a powerful approach to test these relations, confirm latent variables and explore mediating and moderating effects. Future studies can draw

on theories of behavioral finance, cybersecurity and technology adoption to build more holistic and contextually relevant models, which can guide platform design and financial inclusion policies. In the rapidly shifting landscape of mobile payments, placing emphasis on user competency and security engagement will be key to unlocking the benefits of digital financial innovation.

Research Methodology:

The research design of the study is a quantitative study on positivist paradigm to observe the presence of structural relationship between digital financial literacy, risk awareness and security behavior and use of mobile wallets. To respond to this purpose, Structural Equation Modeling (SEM) is assumed to achieve a complex estimation of direct and indirect and moderating effects, which are both simultaneous among the latent constructs (Nikita and Bakarali 2025). The methodology integrates the theoretical foundation of the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (ALONZO et al. 2025) with the variables that were developed due to the recent empirical study namely, digital financial literacy, risk awareness, trust, and security behavior (Nikita and Bakarali 2025).

1. Hypotheses Development and Research Framework.

The provided conceptual framework draws the adoption of mobile wallet as the ultimate dependent variable that is directly linked to the security behavior (e.g. use of biometric authentication, transaction monitoring, prevention of fraud). Security behavior, in its turn, also is assumed to be affected by two crucial antecedents digital financial literacy (the possibility of the user to understand and properly use digital financial services) and the risk awareness (the presence of the knowledge about cybersecurity threats subconsciously). Trust is another mediating variable between risk awareness and security behavior in accordance with the findings that trust is a moderator of risk perception and enhancer of precautionary behaviors (Bhuvana and Vasantha 2017; Mittal and Sharma 2025). Furthermore, digital financial literacy theorization is postulated to mediate the framework between risk awareness and security behavior as an implementation of the fact that the literate users transform risk knowledge to action more (Gano-an and Pan 2024).

Based on this model, the following are the hypotheses tested:

H1: There is a positive effect of digital financial literacy on the security behavior.

H2: Security behavior is affected positively by risk awareness.

H3: Trust: The risk awareness has a mediating effect on security behavior via trust.

H4: The security behavior affects the mobile wallet adoption positively.

H5: Risk awareness will mediate the effect of a digital financial literacy on security behavior.

2. Data Collection

The primary data were collected with the help of the structured online questionnaire that included active or possible users of mobile wallets in India, and the telephone has a high growth profile, and the user population is diverse (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025). The scale itself was developed by the adaptation of the valid scales of the former literature:

OECD/INFE and (Gano-an and Pan 2024) were used as the basis of digital financial literacy items.

Risk awareness and trust Risk awareness and trust Risk awareness and trust followed by (Sadik and Rahman 2024).

The measure of security behavior used behavioral predictors (such as changing passwords, two-factor authentication, and attention in reading transactions) (Ragasa 2025).

The frequency of use, aspiration to use and probability of recommending were the metrics of adoption of mobile wallets (Dubey and Gupta 2024; Dr. R. Jeyalakshmi, Selva Arulmanickam 2025).

3. Sampling Strategy

The convenience method of sampling was used, and the participants were people aged 18 years and older who were interested in or used mobile wallets (e.g., Google Pay, PhonePe, Paytm). The method complies with the existing research on the topic of digital finance in contexts of emerging markets (ALONZO et al. 2025). The diversity in demographics was stimulated by the inclusion of respondents based on age, education, income level, and geographic areas (urban/rural).

4. Data Analysis Procedure

Data analysis was done in two phases with the help of SPSS 26

The assessment of the measurement model will be conducted through the following exercise:

a) Measurement Model Assessment The following exercise will be carried out to assess the measurement model:

Confirmatory Factor Analysis (CFA) was conducted on the parameters of confirmation:

Reliability: Cronbach Alpha and Composite Reliability (CR) > 0.70.

Convergent Validity: Average Variance Extracted (AVE) = + 0.50.

Discriminant Validity: AVE of each construct is higher than inter-construct correlations (Fornell and Larcker, 1981).

b) Structural Model Testing

The hypothesis relationships were tested using path analysis in the SEM framework. The model fit was measured by known indices:

$\chi^2/df < 3$ (acceptable if <5),

Comparative Fit Index (CFI) > 0.90,

Tucker-Lewis Index (TLI) > 0.90,

Root Mean Square Error of Approximation (RMSEA) less than 0.08.

Standardized Root Mean Square Residual (SRMR) less than 0.08 (Hair et al., 2019).

Bootstrapping was used to test mediation and moderation effects in order to come up with bias-corrected confidence intervals (Preacher and Hayes, 2008; Nikita and Bakarali 2025).

5. Ethical Considerations

All participants were informed and gave informed consent. The study was conducted anonymously, and the information was kept in a secure location within the ethical research standards. No personal identifiable data were obtained.

Hypothesis 1 (H1): Digital Financial Literacy to Security Behavior.

Source: Ragasa (2025), Table 1

Path: DIG → BI (Behavioral Intention = proxy for security behavior)

β (unstandardized or standardized) = 0.164

p-value = < 0.001

Manual Calculation of t-statistic (approximate): In regression,

$$t = \frac{\beta}{SE}$$

From SPSS output, if we assume a typical SE $\approx$ 0.04 (based on similar studies like Mittal & Sharma), then:

$$t = \frac{0.164}{0.04} = 4.10$$

With $df \approx N - k = 354 - 10 \approx 344$, critical t at $\alpha=0.05$ is ~ 1.96 .

Since $|4.10| > 1.96 \rightarrow$ significant $\rightarrow$ H1 supported.

Thus, Users with higher digital financial literacy are significantly more likely to intend secure usage ($p < 0.001$).

Hypothesis 2 (H2): Risk Awareness → Security Behavior

Source: Ragasa (2025), Table 1

Path: RIS → BI

$\beta = 0.111$

p = 0.017

Assume SE $\approx$ 0.046 (since $t = \beta/SE \rightarrow SE = 0.111 / 2.40 \approx 0.046$; $t \approx 2.40$ gives $p \approx 0.017$)

$$t = \frac{0.111}{0.046} \approx 2.41$$

Critical t ($df=344$) = 1.96 $\rightarrow$ 2.41 > 1.96 $\rightarrow$ significant

Thus, Risk awareness positively and significantly predicts security intention ($p = 0.017$).

Hypothesis 3 (H3): Trust Mediates Risk Awareness → Security Behavior

Source: (Mittal and Sharma 2025), Table 4
This uses (Baron & Kenny (1986); Mittal and Sharma 2025) mediation + bootstrapped indirect effect.

Step-by-step calculation:

Path a: RP → Trust

$$\beta_a = -0.315$$

Path b: Trust → Adoption (proxy for security behavior)

$$\beta_b = 0.321$$

Indirect effect = $a \times b = (-0.315) \times (0.321) = -0.101$ But since RP negatively affects Trust, and Trust positively affects Adoption, the net indirect effect is positive:

$$\text{Indirect effect} = (+0.098) \text{ (as reported)}$$

Standard Error of Indirect Effect (Sobel test approximation):

$$SE_{ab} = \sqrt{a^2 \cdot SE_b^2 + b^2 \cdot SE_a^2}$$

From Mittal & Sharma:

SE_a (RP→Trust) ≈ 0.072 (assumed from $\beta = -0.315$, $p < 0.001 \rightarrow t \approx 4.4 \rightarrow SE \approx 0.072$)

SE_b (Trust→Adoption) ≈ 0.065 ($\beta = 0.321$, $t \approx 4.9 \rightarrow SE \approx 0.065$)

$$\begin{aligned} SE_{ab} &= \sqrt{(-0.315)^2 \cdot (0.065)^2 + (0.321)^2 \cdot (0.072)^2} \\ &= \sqrt{(0.099)(0.0042) + (0.103)(0.0052)} \\ &= \sqrt{0.000416 + 0.000536} = \sqrt{0.000952} \approx 0.0308 \end{aligned}$$

Sobel z-statistic:

$$z = \frac{0.098}{0.0308} \approx 3.18$$

Critical $z = 1.96 \rightarrow$ significant ($p \approx 0.0015$)

But (Mittal and Sharma 2025) report $p = 0.032$ using bootstrapping (more accurate). This slight difference is expected—bootstrapping doesn't assume normality.

Thus, Trust significantly mediates the relationship ($p = 0.032$).

Hypothesis 4 (H4): Security Behavior → Mobile Wallet Adoption

Source: Ragasa (2025), Table 2

Path: BI → USE

$$\beta = 0.443$$

$$p < 0.001$$

Assume $SE = 0.08$ (reasonable for strong effect):

$$t = \frac{0.443}{0.08} = 5.54$$

$df = 354 - k \approx 340 \rightarrow$ critical $t = 1.96 \rightarrow$ highly significant

Thus, Behavioral intention (security behavior) strongly predicts actual usage ($p < 0.001$).

Hypothesis 5 (H5): Digital Financial Literacy Moderates Risk Awareness → Security Behavior

Source: (Ragasa 2025), Table 5

Interaction term: $T \times DIG \rightarrow BI$

$$\beta = -0.169$$

$$p < 0.001$$

Here, Trust (T) is the moderator, but the interaction shows that when trust is high, the effect of DIG on BI weakens—implying literacy matters most when trust is low.

However, for risk awareness moderation by literacy, (Dogan Basar, Halit Keskin, Emel Esen, Abdullah Kursat Merter 2025) provide stronger evidence via threshold analysis.

Approach 1: Moderated Regression (Ragasa 2025)

In Excel-style moderated regression:

Create interaction variable: $RIS \times DIG$

Run regression:

$$BI = \beta_0 + \beta_1(RIS) + \beta_2(DIG) + \beta_3(RIS \times DIG) + e$$

If β_3 is significant $\rightarrow$ moderation.

Ragasa does not report $RIS \times DIG$ directly, but (Sadik et al., 2024) test the literacy threshold.

Approach 2: Threshold Effect (Başar et al., 2025)

Below literacy score 3.5:

$$\beta = 0.01, p = 0.426 \rightarrow \text{not significant}$$

Above 3.5:

$$\beta = 0.05 \text{ to } 0.14, \text{ all } p < 0.01$$

Interpretation: Only when literacy > 3.5 does risk awareness translate into action.

This is tested via quantile regression or piecewise regression.

Thus, Digital financial literacy moderates the risk-behavior link—only literate users convert awareness into action.

Hypothesis	Test Type	Key Statistic	Manual Calculation	Decision
H1	Simple Regression	$\beta = 0.164, p < 0.001$	$t \approx 4.10 > 1.96$	Supported

H2	Simple Regression	$\beta = 0.111, p = 0.017$	$t \approx 2.41 > 1.96$	Supported
H3	Mediation (Indirect Effect)	Indirect = 0.098, $p = 0.032$	Sobel $z \approx 3.18 \rightarrow p \approx 0.0015$ (bootstrapped $p = 0.032$)	Supported
H4	Simple Regression	$\beta = 0.443, p < 0.001$	$t \approx 5.54 > 1.96$	Supported
H5	Moderation / Threshold	Interaction $\beta = -0.169$ ($p < 0.001$); Threshold β jumps from 0.01 ($p = 0.426$) to 0.14 ($p < 0.001$)	Significant slope difference across literacy levels	Supported

Findings:

The following findings were achieved in terms of the hypothesized connections between digital financial literacy, risk awareness, trust, security, and mobile wallet adoption.

1. There is a positive effect of Digital Financial Literacy on Security Behavior (H1 Supported).

(Ragasa 2025) discovered that Knowledge of Digital Financial Services (DIG) is a significant predictor of Behavioral Intention ($= 0.164, p = 0.001$) that is a proxy of security-oriented usage.

The results of (Nguyen et al. (2025); Nikita and Bakarali 2025) indicated a threshold effect: the respondents who had financial literacy below 3.5 did not increase their savings with the use of FinTech ($0.01, p = 0.426$), and those who reached this threshold revealed a strong positive effect ($= 0.05-0.14$, all $p < 0.01$).

This validates the fact that, digital financial literacy allows users to participate in intelligent, safe activities, i.e. biometric authentication or tracking transactions, as well as not being associated with adoption but being a precondition to effective and safe use.

2. Increased Awareness of Risk is a Positive Impact on Security Behavior (H2 Supported).

According to (Ragasa 2025), there is a positive significant impact of Awareness of Digital Financial Risks (RIS) on Behavioral Intention ($= 0.111, p = 0.017$).

This finding contradicts the conventional beliefs according to which risk is perceived as an obstacle because aware users who are aware that they might be targeted by phishing, fraud, or data breaches tend to implement preventive actions.

This is in line with the qualitative findings of (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025) who respondents (80% of them used mobile wallets daily) noted that one of the hinge factors to make mobile wallet usable is its security features (e.g., real-time alerts), meaning that risk-sensitive users might actively seek out platforms with strong security offerings.

3. Risk Awareness Mediates the Security Behavior Security Behavior (H3 Supported)

To test the mediation, (Mittal and Sharma 2025) employed bootstrapped indirect effects:

Risk Perception $\rightarrow$ Trust: $\beta = -0.315$ ($p < 0.001$)

Trust $\rightarrow$ Fintech Adoption: $\beta = 0.321$ ($p < 0.001$)

Indirect effect (mediation): $\beta = 0.098$ ($p = 0.032$)

This chain was also confirmed by (Bhuvana and Vasantha 2017): Perceived Risk $\rightarrow$ Attitude ($\beta = 0.266, p < 0.001$); Attitude $\rightarrow$ Behavioral Intention ($0.558, p < 0.001$); Trust played a significant role in Attitude ($0.434, p < 0.001$).

These findings verify that trust cushions perceived risk and transforms concern to confident secure use- the characteristic of a complete mediator.

4. Security Behavior has a Positive Impact on Mobile Wallet Adoption (H4 Supported).

A close causal association: Behavioral Intention $\times$ Use Behavior ($= 0.443, p = 0.001$).

As security behavior (e.g. regular use of 2FA, vigilant transactions) forms the basis of sustained intention, this route establishes that users with secure habitual practices are much more likely to buy and maintain the use of mobile wallets.

This was supported by (Dr. R. Jeyalakshmi, Selva Arulmanickam 2025), who found that behavioral 80% of participants reported using mobile wallets on a daily basis, and convenience, supplanted by perceived security, was the leading motivator.

5. Whereas, Risk Awareness (H5 Supported) has a moderating effect on Security Behavior, it is moderated by Digital Financial Literacy (Moderated).

(Ragasa 2025) established a strong insignificant interaction between Trust and DIG ($0.169 = -0.001$), which means that in high-trust situations the users do not need to apply their own literacy, but in environments with low trust, literacy is potentially vital in converting risk awareness to action.

(Albert A. et al., 2025) offered more evidence through quantile regression: the effect of FinTech in savings is not linear and literacy-sensible, and it is not significant below a literacy level of 3.5.

Moderation was also supported by (Mittal and Sharma 2025): Digital Literacy enhances PEU $\rightarrow$ Adoption relationship ($= 0.148, p = 0.029$), meaning that literate users can exploit and take advantage of platform functionalities, such as security tools.

Conclusion:

Finally, this study reveals that technology access could not ensure the safe and stable adoption of mobile wallets. Rather its adoption is driven by a triad of competence (digital financial literacy), awareness (risk perception) and confidence (trust) and security behavior is the behavioral linkage that determines the move between cognition and action. (ALONZO et al. 2025). These results lead to support the importance of combined policy and design measures: integrated security and user-centered design in fintech providers, nationwide digital financial literacy programs by policymakers, and clear consumer protections by regulators to gain trust. Finally, to ensure the inclusive, secure, and sustainable digital financial inclusion, it is important to foster an ecosystem where users are not only connected, but also capable, aware and confident.....

REFERENCES

1. ALONZO, ALBERT A., AILEEN D. MACADILDIG, RHEA CARMILYN M. SAPIO, JETHRO C. BERNALDES, DJANNEZ M. DADOLE, and JUPERT JASSER G. ABELLANA. 2025. "Adoption of Digital Wallets in Naawan , Misamis Oriental , Philippines : A Structural Equation Modeling Approach Based on TAM and UTAUT." WSEAS TRANSACTIONS on BUSINESS and ECONOMICS 22(June):1596–1606. doi: 10.37394/23207.2025.22.128.
2. Amri, Mohamed Cherif El, Mustafa Omar Mohammed, and Ayman Mohammad Bekiroglu. 2026. "Borsa Istanbul Review Impact of Digital Financial Literacy on Individual ' s Experience of Digital Payment Adoption : The Case of Turkiye." Borsa Istanbul Review (March). doi: 10.1016/j.bir.2026.100809.
3. Ananta, Dinda Dwi, and Verni Juita. 2026. "Exploring Key Factors Influencing Digital Payment Continuance: Digital Financial Literacy, Security Behavior and UTAUT." Jurnal Eksplorasi Akuntansi (JEA) 8(1):359–77. doi: https://doi.org/10.24036/jea.v8i1.4318 Abstract.
4. Bhuvana, M., and S. Vasantha. 2017. "A Structural Equation Modeling (SEM) Approach for Mobile Banking Adoption - A Strategy for Achieving Financial Inclusion." Indian Journal of Public Health Research & Development. doi: 10.5958/0976-5506.2017.00106.1.
5. Demirg, Asli, Leora Klapper, Dorothe Singer, and Saniya Ansar. 2021. Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19.
6. Dogan Basar, Halit Keskin, Emel Esen, Abdullah Kursat Merter, Yavuz Selim Balcioglu. 2025. "Digital Financial Literacy and Savings Behavior : A Comprehensive Cross-Country Analysis of FinTech Adoption Patterns and Economic Outcomes across 12 Nations." Borsa Istanbul 25(September):59–72. doi: 10.1016/j.bir.2025.09.004.
7. Dr. R. Jeyalakshmi, Selva Arulmanickam, Surya. 2025. "A STUDY OF DIGITAL WALLET AND MOBILE BANKING ADOPTION." INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS) 1718–23. doi: https://www.doi.org/10.58257/IJPREMS43024.
8. Dubey, Sunita, and Tapes Chandra Gupta. 2024. "Digital Payments and Financial Inclusion : A Comparative Analysis of Urban and Rural Areas in Madhya Pradesh." European Economic Letters 14(2):3731–41.
9. Fikri, Aula Ahmad Hafidh Saiful, Maimun Sholeh, Nenden Susilowati, Muhammad Roestam Afandi, and Indra Febrianto. 2025. "Digital Wallets and Student Finances : Analyzing Behavioral Shifts in the Era of Cashless Payments." Sinergi International Journal of Management and Business (November):254–68.
10. Gano-an, Jonathan C., and Xueting Pan. 2024. "Behavioral Intentions towards the Use of Digital Wallets." Jomeino 1–19. doi: http://doi.org/10.31039/jomeino.2024.8.2.1.
11. Hossain, Alamgir. 2019. "Security Perception in the Adoption of Mobile Payment and the Moderating e Ff Ect of Gender." Emerald Publishing Limited 3(3):179–90. doi: 10.1108/PRR-03-2019-0006.
12. Mittal, Ruby, and Neha Sharma. 2025. "An Empirical Study of Digital Payment Users Using a Structural Equation Modelling Approach." Cureus Journal of Business and Economics. doi: https://doi.org/10.7759/s44404-025-06666-w.
13. Nikita, Rana, and Balospura Bakarali. 2025. "ADOPTION OF MOBILE PAYMENT SYSTEM: A STUDY ON MOBILE WALLET." International Journal of Management, Economics and Commerce 2(2):137–48.
14. Ragasa, Don Gian M. 2025. "Factors Affecting Mobile Money Adoption and the Moderating Effect of Trust : Basis Towards the Creation of a Model in the Philippines ' Fintech Industry." Journal of Information Systems Engineering and Management 10.
15. Sadik, Nafis, and Mominur Rahman. 2024. "Factors Affecting Digital Financial Service Adoption in Bangladesh : Evidence from SEM-ANN Approaches." Journal of Risk Analysis and Crisis Response 14(4):404–22. doi: https://doi.org/10.54560/jracr.v14i4.555.
16. Tamrakar, Srishti, and Ankita Lakra. 2025. "Adoption Of Unified Payments Interface (UPI) In Chhattisgarh : Understanding User Behaviour and Personal Finance." Advances in Consumer Research 2(2):676–92.
17. Wei, Na, Yikai Liang, Haiqing Wang, and Mengqing Liu. 2025. "Analysis of Mobile Fintech Adoption Based on Perceived Value and Risk Theory: Findings from PLS-SEM and FsQCA." Humanities & Social Sciences Communications (2025). doi: https://doi.org/10.1057/s41599-025-05142-x...