Advance Journal of Econometrics and Finance

Vol-4, Issue-2, 2026

Advance Journal of Econometrics and Finance

Online ISSN
2959-8990
Print ISSN
2959-8982
https://ajeaf.com/index.php/Journal/About

Name of Publisher: SCHOLAR CRAFT EDUCATION & RESEARCH HUB

Review Type: Double Blind Peer Review

Journal Frequency: Quarterly Research Journal (4- Issue)

FinTech Adoption under Perceived Risk: The Mediating and Moderating Role of Trust, Usefulness, and Digital Literacy

Saba Imam

Saba Imam
Faculty, Sindh Institute of Management and Technology - E-mail: imam.saba@gmail.com

Abstract

The rapid expansion of financial technologies (FinTech) has transformed financial service delivery; however, user adoption remains uneven in emerging economies where concerns related to security, trust, and digital capability persist. Addressing this gap, this study investigates how risk perception influences behavioral intention to adopt FinTech services by integrating the Technology Acceptance Model (TAM) and Protection Motivation Theory (PMT). Specifically, the study examines the mediating roles of trust and perceived usefulness, alongside the moderating role of digital literacy, to explain users' adoption intentions under conditions of perceived risk. The proposed model is tested using survey data collected from 410 banking customers in Pakistan through structural equation modeling (PLS-SEM). The findings reveal that risk perception exerts a significant negative effect on behavioral intention. However, this relationship is partially mediated by trust and perceived usefulness, indicating that users cognitively and relationally process perceived risk before forming adoption intentions. Furthermore, digital literacy significantly moderates the risk intention relationship, weakening the deterrent effect of perceived risk among more digitally competent users. This study advances FinTech adoption by integrating threat appraisal and benefit evaluation mechanisms into a unified framework, extending both TAM and PMT. The findings offer actionable insights for policymakers and FinTech providers seeking to enhance trust, promote digital capability, and foster inclusive digital financial adoption in emerging economies.

Keywords:
FinTech adoption, Risk perception, Behavioral intention, Trust, usefulness, Digital literacy.

DOI: https://doi.org/10.5281/zenodo.20009426

Introduction

Rapid FinTech dispersion has essentially transformed the provision and usage of financial services by entrenching electronic applications in the daily financial decision-making (George, 2024). Mobile banking, digital wallets, peer-to-peer payments, and app-based financial platforms have increased access to formal financial systems, especially in emerging economies where the traditional banking infrastructures are unevenly built (Ndukaji, 2025). Although there has been this growth in technologies, there has been a discrepancy in the acceptance of FinTech services by their users, showing a severe lack of connection between the technological presence and the real end-user acceptance. This gap implies that the problem of adoption of FinTech is more technological or infrastructural in nature, but resides in the psychological assessment of users, perceived riskiness, and personal ability in the online setting.

In third-world countries like Pakistan, this adoption gap is particularly high given the lingering fears of data security, financial fraud, invasion of privacy, and uncertainty of regulation. To some users, interactions with FinTech platforms are associated with providing sensitive personal and financial data in somewhat intransparent digital systems, which increases the sense of vulnerability (Oladinni and Odumuwagun, 2025). These issues increase the level of risk perception, and such a risk is a key deterrent to technology use in high-stakes digital environments (Frank et al., 2024). As a result, regardless of the efficiency, convenience, and inclusion offered by FinTech services, when the risk is perceived more, the behavioral intention of people to use these technologies can be reduced, especially among the population groups that lack exposure to safe digital systems (Appiah and Agblewornu, 2025).

Perception of risk, however, does not work independently. Earlier studies (Zhu et al., 2025; Kaur and Arora, 2021) indicate that the process of user responding to perceived risk is defined by cognitive and relational processes that may enhance or reduce the adverse impact of perceived risk. Trust is very important in mitigating uncertainty as it indicates dependability, ethical behavior, and credibility of the institution. Meanwhile, perceived usefulness affects the decision-making process of users who are more inclined to believe that FinTech platforms are valuable enough to risk losing (Appiah and Agblewornu, 2025). These constructs combine to influence the cognitive and emotional assessment of digital financial technologies by the users. In the conditions of high trust in the platform and perceived usefulness of the service, users can accept residual risks, which indicates that the relationship between risk perception and adoption intention is indirect and conditional, rather than strictly deterministic (Xia et al., 2025).

In addition to these psychological processes, personal user abilities also have an impact on risk interpretation and management. The capacity to identify security features, estimate online threats, and interact with digital platforms without fear is predetermined by digital literacy as the ability to use, evaluate, and access digital technologies successfully (Elrayah and Jamil, 2023). Digitally competent users can be more successful in implementing effective coping measures, including password maintenance, verification, and awareness of fraud, reducing the negative influence of the risk perception on the intention to adopt (Ogunola et al., 2024). Conversely, the less digitally literate users might feel even more uncertain, and risk perception will become one of the strongest inhibitors to using FinTech (Hamdani, 2025). This ability heterogeneity highlights why the study of adoption behavior should consider an end-user computing lens in which the personal skills and perceptions influence the results of technology usage.

Even though the current literature has explored the adoption of FinTech based on the existing acceptance models, a number of limitations still exist in the literature (Al-Sharafi et al., 2025; Jafri et al., 2024). First, Grover and Lyytinen (2015) are more based on the TAM, focusing mainly on perceived usefulness and ease of use, and under-theorizing threat appraisal and coping reactions of users. Second, studies based on PMT have frequently been conducted with a cybersecurity or health background, and few have been incorporated with financial technology adoption. Third, there is limited empirical data regarding the role of multiple mediators (trust and perceived usefulness) in the joint transmission of the effect of risk perception, especially when moderated by digital literacy as an individual coping resource. Such gaps are particularly acute in developing economies, whereas the process of digital transformation is uneven, and users have varying access to it.

To fill this gap, the study empirically tests an integrated framework of the TAM and PMT. Particularly, the research investigates (i) how the perception of risk directly influences the behavioral intention to use FinTech services, (ii) whether other mediating variables affect the relationship between the two variables, and (iii) whether there is a moderating variable that can influence the user reaction towards the perceived risk. Based on survey data of banking customers in Pakistan

and structural equation modeling, the research provides a subtle perspective on the impact of cognitive appraisals, emotional trust, and individual capabilities in their combination to affect the intention to use FinTech.

2. Theoretical Framework and Hypotheses Development

2.1 Theoretical Foundation

The adoption of FinTech cannot be analyzed through a simple theoretical prism that would include only the assessments of technological advantages that users can have and the perceptions of the threats posed by digital contexts of financial activity. The paper is based on the TAM and PMT in the development of an inclusive and user-friendly model to illustrate the behavioral intention under uncertain conditions. TAM underlines the rational assessments of the usefulness of technology, whereas PMT underlines the process through which people evaluate and react to the perceived risks. By taking into consideration these two views, a more comprehensive explanation of FinTech usage intention will be possible, especially in a situation where there are lack of trust, security fears, and capability gaps.

According to the TAM, people develop intentions to utilize a technology depending on their mental assessment of the anticipated performance advantages (Almogren and Aljammaz, 2022). Perceived usefulness has always been the most effective predictor of behavioral intention in the digital environment, which can be seen in online banking, mobile payments, and financial platforms (Ho et al., 2025). Perceived usefulness shows how users feel that the digital financial services improve the efficiency, accessibility, and quality of financial management (Oehlschlaeger et al., 2025). However, TAM has been criticized for its inadequate attention to risk-related issues, particularly in high-stakes situations involving sensitive financial information. This weakness implies that TAM cannot describe the adoption behavior alone in the case of perceived risk when the perceived risk is salient.

To overcome this drawback, the current research integrates PMT that explains how people react to perceived threats by having cognitive appraisals of risk severity, vulnerability, and the ability to cope with it (Bubeck et al., 2025). According to PMT, when a person feels threatened by something, e.g., a financial fraud, invasion of privacy, abuse of the system, and so on, then the person can undergo protective decision-making, which can lead to avoidance behavior (Alam et al., 2025). Perceived risk in FinTech situations acts as a threat evaluation, which may inhibit the intentions to adopt unless users believe that they have adequate coping strategies. This research incorporates PMT to consider psychological mechanisms by which perceived risk is important in forming behavioral intention that goes beyond the rational benefit consideration.

2.2 Risk Perception and Behavioral Intention

Risk perception is when a person makes a subjective evaluation of the possible adverse effects of using a technology, such as financial loss, misuse of data, intrusion into privacy, and system malfunction (Renn and Benighaus, 2013). The perception of risk is slightly more relevant to digital financial contexts because transactions in digital financial settings are intangible and impersonal, meaning that the users cannot directly see system protection or institutional responsibility (Jakob et al., 2025). Consequently, the perceived risk tends to become a significant inhibitor of technology adoption, particularly in the case of developing economies where regulation enforcement and consumer protection mechanisms can be viewed as inefficient (Abdurrahman, 2025).

In the PMT frame of reference, an increase in risk perception leads to an increase in threat appraisal and therefore users develop avoidance-based behaviors instead of engagement (Goldenberg and Arndt, 2008). Users who view high-risk in FinTech situations do not adopt easily or even adopt at all despite an apparent technological gain (Abdul-Rahim et al., 2025). The literature on empirical research (Appiah and Agblewornu, 2025; Xie et al., 2021) indicates that there is a negative correlation between risk perception and the intention to use digital financial services, meaning that the perceived risk is an element that lowers the willingness of users to use FinTech services.

In the end-user computing environment, behavioral intention will denote the willingness of a user to embrace and utilize a digital system in their daily financial tasks. It is a well-known fact that behavioral intention is one of the most efficient predictors of actual system usage. The behavioral intention reduces when the perceived risk is higher than the perceived benefits and coping resources. According to this theoretical argument, the hypothesis set out below is proposed:

H1: Risk perception has a significant effect on behavioral intention to use FinTech platforms.

2.3 Trust as a Mediating Mechanism

The role of trust is important in lessening the uncertainty and aiding the adoption in digital settings with information asymmetry and perceived vulnerability (Huda, 2024). The trust is used in the FinTech context to describe how users have faith in the platform and the provider that they will be reliable, competent, and dedicated to keeping the financial and personal information of their users safe. Trust is considered a relational assurance mechanism to counter uncertainty caused by perceived risk (Poppo et al., 2016).

Trust is a mediator between risk perception and behavioral intention because it turns the threat perceptions into manageable issues (Kaur and Arora, 2021). The more users trust a FinTech platform, the more confident they become that such risks can be addressed using the institutional protection mechanisms, professional ethics, and technological protection measures (Aldboush and Ferdous, 2023). As a result, trust mitigates the harm perceived risk has on the intention to adopt (Ho et al., 2017). The mediating position is specifically applicable to new economies, where users commonly use trust indicators to offset inadequate regulatory transparency or previous experience. The TAM and PMT view that trust as a complement to perceived usefulness is because it helps address emotional and relational aspects of adoption that cannot be put across by the cognitive judgment of benefit. A lack of trust can inhibit adoption even in the presence of a high level of perceived usefulness, where the unaddressed risk issues exist. Thus, trust is an important mediator by which risk perception indirectly affects behavioral intention. In this connection, the hypothesis is the following:

H2: Trust mediates the relationship between risk perception and behavioral intention to use FinTech platforms.

2.4 Perceived Usefulness as a Mediating Mechanism

The concept of perceived usefulness suggests how much people believe that the use of a technology will improve their task performance or decision-making effectiveness (Permana and Setianto, 2019). TAM states that among all determinants of behavioral intention, perceived usefulness is the strongest one, especially with utilitarian systems like FinTech platforms (Darmansyah et al., 2021; Shahzad et al., 2022). The perceived usefulness includes such benefits as convenience in transactions, cost-effectiveness, real-time access, and financial control enhancement (Joshi et al., 2021).

Nevertheless, perceived usefulness is not insulated from perceived risk. With users having high perceptions of risk, their usefulness may be compromised because they will discount the benefits expected by the possibility of incurring losses or other negative effects. In that regard, risk perception has the potential to decrease behavioral intention through the perceived usefulness diminished indirectly (Hansen et al., 2018). On the other hand, users who find FinTech platforms to be very helpful may be readier to accept residual risk and may consider the adoption to be a tradeoff involving the benefits and threats that may arise (Wei et al., 2025).

This mediating position corresponds to the logic of cognitive evaluation of TAM and satisfies the focus on threat appraisal of PMT. The model characterizes the role of benefit evaluations as a cognitive filter, using which perceived risk affects adoption intention by placing perceived usefulness as an intervening variable. So, the next hypothesis will be as follows:

H3: Perceived usefulness mediates the relationship between risk perception and behavioral intention to use FinTech platforms.

2.5 Digital Literacy as a Moderating Capability

Digital literacy is the skill of getting access to, comprehending, assessing, and utilizing digital technologies safely and knowledgeably (Salganova and Osipova, 2023). In addition to technical skills, online abilities encompass the ability of users to identify the risks on the web, perceive security indicators, and employ protective practices (Elrayah and Jamil, 2023). Digital literacy is, therefore, one of the vital coping resources of the PMT.

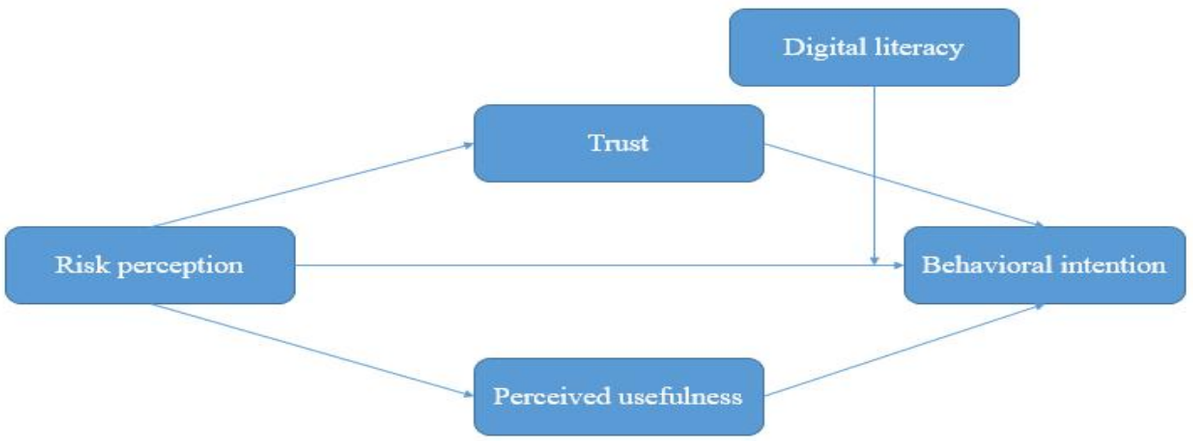
The more digitally literate the users are, the more they can deal with the perceived risks by using knowledge-based interventions, including platform authenticity verification, learning about security controls, and preventing scams (Nguyen et al., 2024). Therefore, the adverse impact of risk perception on behavioral intention is supposed to be less intense among digitally literate users (Raut and Kumar, 2024). Conversely, users who are low in digital literacy might be more susceptible, and risk perception comes out as a stronger factor discouraging adoption (AbdulKareem and Oladimeji, 2024). As an end-user computing concept, the view of digital literacy is that heterogeneity in the capacity of the user population can define technology attainments beyond system attributes. Digital literacy

explains why perceived risk of a similar magnitude can result in a variety of adoption choices made by the various groups of users due to the moderating nature of the relationship between perceived risk and behavioral intention. Based on that, the hypothesis presented below is proposed:

H4: Digital literacy moderates the relationship between risk perception and behavioral intention to use FinTech platforms.

2.6 Conceptual Framework

Figure I below is the conceptual framework.



Source: Authors' own generated

Figure I

3. Methodology

4. 3.1 Research Design and Approach

5. The research design of this study is based on a quantitative, deductive research design in order to empirically test the theoretical framework proposed to integrate the TAM and the PMT. The approach used is survey-based due to the fact that the study describes the relationship between variables, which cannot be directly observed and should be measured by using standardized methods. In line with the previous technology adoption studies (Naeem et al., 2026; Anser et al., 2025a,b; Shaikh et al., 2025a,b), this design allows testing the theory and generalizing the results to similar end-user groups.

6. 3.2 Population and Sampling Strategy

7. The target audience includes the banking consumers in Pakistan who are exposed to digital financial services such as mobile banking applications, digital wallets, and online payment systems. The country of Pakistan offers an appropriate empirical setting because of its swift financial service digitalisation in addition to unresolved issues of digital trust, security issues, and a general difference in digital literacy rates (Naeem et al., 2025). The purposive sampling method was also used to make sure that the respondents had enough knowledge about FinTech platforms to fairly assess the study constructs. The participants were filtered to make sure that they were either active users or informed the potential users about the digital financial services. This strategy is suitable in the study of FinTech, where the adoption-related perceptions cannot be evaluated among people who have not been exposed to the technology (Anser et al., 2024; Sial et al., 2025; Bohio et al., 2025; Shahab et al., 2025). Respondents were selected to reside in the largest cities and semi-urban areas (Lahore, Karachi, and Islamabad) where the services of FinTech are most available. Although the purposive sampling method does not allow generalization statistically, it increases the construct validity since the answers will be informed by pertinent user experience. The limitations section admits the implications of this sampling choice.

3.3 Sample Size and Data Collection Procedure

The 620 questionnaires were distributed via a mixed-mode data collection plan. 420 questionnaires were conducted online via Google Forms, and 200 questionnaires were dispatched physically by visiting bank branches and financial service centers. Following data screening and elimination of incomplete or inconsistent responses, 410 valid questionnaires were retained to be analyzed, and hence an overall response rate of about 66.1 which is acceptable in behavioral research. The collection of data was done during a period of three months, so that there is sufficient coverage of a wide range of respondents.

3.4 Measurement Scales

The questionnaire was divided into two parts. The initial part involved the demographic data, which included gender and age. The second part assessed the constructs of the study with already validated multi-item scales modified to the FinTech context. Everything was evaluated in terms of the five-point Likert scale between 1 (Strongly Disagree) and 5 (Strongly Agree).

The five items based on Kaur and Arora's (2021) e-service risk scales were adjusted to measure risk perception and related to financial, privacy, and performance issues. Four items related to the level of trust were used to measure trust in platform reliability, integrity, and security (Anshori et al., 2022). The usefulness was evaluated on five items that capture the degree to which the FinTech services increase efficiency and financial management (Perwitasari, 2022). The behavioral intention was assessed with four questions that reflected the intention and the readiness of users to use FinTech platforms (Shahzad et al. 2022). They used six items to assess digital literacy that allow determining the level of effectiveness in using digital technologies and being able to use them safely with the knowledge of online risks and security habits (Elrayah and Jamil, 2023).

3.5 Data Analysis Technique

The model was tested by applying SEM through Smart PLS software. This method can be used especially when the model is complicated with many mediating and moderating relations. SmartPLS was chosen instead of covariance-based SEM methods due to some methodological reasons. To start with, the research focuses on prediction and extension of theory, which is congruent with the variance-oriented orientation of PLS-SEM. Second, PLS-SEM can withstand non-normal data distributions, as is typical of survey-based behavioral research. Third, the method effectively captures the effect of interaction and the presence of an indirect pathway, and therefore, it would be suitable to test the dual mediation and moderation hypothesis of the study.

3.6 Common Method Bias

The data was self-reported, procedural and statistical controls were adopted to reduce common method bias. Procedurally, respondents were made to be assured of anonymity, and they were told that there were no right or wrong answers, eliminating evaluation anxiety. The way the questionnaire was designed separated predictor and criterion constructs to reduce the effect of response pattern bias. The collinearity diagnostics were checked statistically, and all the values of the VIF were found to be significantly lower than the recommended values, which means that the presence of common method bias was not going to pose a threat to the validity of the results. All these actions increase the validity and strength of the empirical findings.

4. Results

4.1 Demographic Statistics

The total valid responses used in the final analysis were 410. According to the demographic data in Table I, the distribution of gender was rather equal, with 59.8% males and 40.2% females. Most of the respondents were in the 26 to 35 age group (46.1%), then the 18 to 25 age group (23.4%), then the 36 to 45 age group (20%), and lastly the 45 years and above group (10.5%). This distribution implies that the sample will mainly include economically active users who will be the most likely to use digital financial services.

Table I: Demographic Result

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	245	59.8
	Female	165	40.2

Age	18–25	96	23.4
	26–35	189	46.1
	36–45	82	20
	Above 45	43	10.5
Total		410	100%

Source: Authors' own generated

4.2 Assessment of Common Method Variance

The data was gathered based on a self-reported, single-source survey tool, CMV was measured and reported in Table II to make sure that the observed relationships were not artificially exaggerated. First, the procedural remedy was applied in the design and administration of surveys. They were ensuring that the respondents are assured of anonymity, there is no right or wrong answer, and linking items that measure predictor and criterion constructs carefully. The steps minimize the evaluation apprehension and consistency bias of the respondents. Second, the single-factor test was an initial test performed by Harman. Analysis of all measurement items in exploratory factor analysis indicated that the greatest factor explained less than 40 percent of the total variance, which means that no individual factor dominated the covariance structure. Such an outcome indicates that CMV is not likely to be a severe issue. Third, the assessment of full collinearity was conducted by evaluating the values of the VIF of all the latent constructs. None of the values of VIF were close to the conservative value of 3.3, which again is an indication that there is no pathological collinearity and which also suggests the results are not biased conclusively by CMV. Collectively, these procedural and statistical evaluations are good indicators that there is no common method variance posing a threat to the validity of the results of the study.

Table II: Common Method Variance

CMV Test	Indicator	Threshold	Result	Conclusion
Procedural remedies	Anonymity, item clarity, variable separation		Implemented	CMV reduced
Harman's single-factor test	Variance explained by first factor	< 50%	31.40%	No CMV
Full collinearity (VIF)	Maximum VIF	< 3.3	2.11	No CMV
Overall CMV risk			Low	Robust results

Source: Authors' calculations based on the recommendations of Podsakoff et al. (2003).

4.3 Measurement Model Evaluation

The measurement model was tested in order to determine the reliability and validity of the constructs in advance hypothesis test. Table III illustrates these results. Reliability of the indicators was also established because all the item loadings were above the recommended value of 0.70, which means that all the indicators had significant relationships with their respective latent constructs. Cronbach's alpha and composite reliability were used to measure internal consistency reliability, with all the values being above the acceptable minimum of 0.70. This shows that there is a high level of internal consistency of the measurement items. The convergent validity was assessed by Average Variance Extracted (AVE), whereas all constructs have an AVE greater than 0.50, indicating that every construct explains more than half the variance in its indicators.

The Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio were used to determine the discriminant validity. Table IV provides Fornell-Larcker results, indicating that all square roots of AVE values of each construct are higher than the correlation values with other constructs, whereas Table V provides HTMT values, which are under the conservative value of 0.85. The overall results indicate that the constructs are empirically dissimilar and have a conceptual definition. All in all, the measurement model has good reliability and validity, and it can be estimated that the measurement model can be used as a solid foundation in assessing the structural relationships.

Table III: Convergent Validity and Composite Reliability

Construct	CB Alpha	CR rho_a	AVE	Indicator	Outer Loading
RP	0.851	0.854	0.673	RP1	0.824
				RP2	0.846
				RP3	0.831
				RP4	0.809
				RP5	0.796
Trust	0.832	0.835	0.701	TR1	0.847
				TR2	0.854
				TR3	0.834
				TR4	0.814
PU	0.872	0.875	0.682	PU1	0.823
				PU2	0.852
				PU3	0.821
				PU4	0.803
				PU5	0.817
BI	0.846	0.849	0.692	BI1	0.836
				BI2	0.868
				BI3	0.833
				BI4	0.806
DL	0.873	0.877	0.658	DL1	0.824
				DL2	0.835
				DL3	0.821
				DL4	0.814
				DL5	0.803
				DL6	0.789

Source: Authors' own generated

Table IV: Fornell and Larcker Criterion

Constructs	RP	Trust	PU	BI	DL
RP	0.82				
Trust	-0.228	0.837			
PU	-0.165	0.302	0.826		
BI	-0.132	0.291	0.357	0.832	
DL	0.119	0.174	0.195	0.241	0.811

Source: Authors' own generated

Table V: Heterotrait-Monotrait Ratio (HTMT)

Constructs	RP	Trust	PU	BI	DL
RP					
Trust	0.274				
PU	0.229	0.364			
BI	0.198	0.345	0.419		
DL	0.156	0.195	0.211	0.269	

Source: Authors' own generated

4.4 Hypothesis Testing

After the confirmation of the measurement model, the structural model was tested to test the hypothesized relationships. The results of the hypothesis are shown in Table VI, that show that risk perception significantly affects behavioral intention negatively and statistically significantly, confirming H1. The obtained result shows that the perceived risk decreases the willingness to use FinTech platforms, which aligns with the threat appraisal mechanism of Protection Motivation Theory. These findings are supported by the mediation analysis that shows that trust moderates the relationship between risk perception and behavioral intention significantly, H2. The increased risk perception gives way to the lack of trust in FinTech platforms, which consequently lowers the intention to adopt. This result highlights the importance of trust as one of the essential relational processes that convert the perceived risk into behavioral results. Perceived usefulness, also, is discovered to show a significant mediation on the relationship between risk perception and behavioral intention, which validates H3. High risk perception undermines the judgments of utility by the users of FinTech and reduces intention to adopt. This finding supports the importance of cognitive benefit appraisal that is highlighted by the TAM. Lastly, digital literacy and risk perception have a positive and significant interaction effect, which supports H4. The result implies that digital literacy will neutralize the adverse influence of perceived risk on the intention to behave. The more digitally literate users can better deal with perceived threat, mitigating the discouraging nature of perceived risk on adoption behavior.

Table VI: Hypothesis Testing

Hypotheses	Path	β	t-value	p-value	Result
H1	RP → BI	-0.132	2.31	0.021	Supported
H2	RP → Trust → BI	-0.7835	3.9	0.001	Supported
H3	RP → PU → BI	-0.4622	3.14	0.002	Supported
H4	DL × RP → BI	0.119	2.05	0.04	Supported

Source: Authors' own generated

5. Discussion

This study was aimed at investigating the effect of perceived risk on the intention of end users to adopt FinTech services through the incorporation of the TAM and PMT in an end-user computing context. The empirical findings support the proposed model quite well, showing that technological utility does not suffice in the adoption of FinTech, as it is a dynamic relationship between the threat appraisal, the cognitive assessment, the relational trust, and the individual ability. In line with PMT, the results indicate that the risk perception has a strong and negative direct influence on the behavioral intention. This finding suggests that users who think there is greater financial, privacy, or performance risk tend to have lower intentions to use FinTech platforms. Perceived risk is a psychological mechanism that produces avoidance behavior in digital financial contexts where transactions involve sensitive data with few opportunities for physical verification. This observation supports the perspective that threat appraisal continues to be a prevailing cause of adoption behavior in high-stakes digital systems, especially in new economies that are marked by institutional uncertainty. In addition to this direct correlation, the findings also indicate that the perceived risk effect is only partially mediated by trust and perceived usefulness, and thus, the role played by indirect processes in the formation of adoption intentions should

not be ignored. The mediation findings indicate that the behavioral reactions of users towards the risk are not entirely reactive but are cognitively and emotionally digested in terms of platform credibility and usefulness. This observation highlights the ineffectiveness of one-dimensional explanations and contributes to the idea that FinTech adoption behavior can be viewed as multidimensional.

The findings are in line with the assertion that trust has a significant mediating role in the perception of risk and behavioral intention relationship. The high perception of risk limits the confidence of users in FinTech channels, which, as a result, decreases their desire to embrace online financial services. The observation is consistent with the relational approach to technology adoption, as it focuses on the role of trust by users to offset the information asymmetry and uncertainty involved in digital interactions.

In an integrated TAM-PMT approach, trust acts as a psychological mediator between the threat appraisal and adoption desire. Whereas PMT serves to explain the tendency of avoidance caused by risks, trust serves as an alternative way to cope with risks and continue regardless of the perceived threats. Perceived risks are less daunting when users have a sense of security, integrity, and institutional support of the platform, hence maintaining adoption intention. Nonetheless, the mediation is partial as opposed to being absolute, meaning that trust diminishes but does not remove the deterrent influence of perceived risk. Such an outcome is especially applicable to the case of emerging economies like Pakistan, where the perception of digital financial systems is typically influenced by the general attitude toward regulation enforcement, cyber attacks, and institutional accountability. Trust in this context is not a system characteristic but a relationship decision that represents how users more generally trust digital structures of governance. The results, consequently, give reason to believe that the efforts to build trust should not revolve around technical protection as additional elements, but visible accountability and regulatory assurance should be introduced.

The research also shows that perceived usefulness greatly mediates the connection between perceived risk and behavioral intention, which supports the main argument on the importance of cognitive benefit evaluation in the adoption of FinTech. Users who view the use of FinTech platforms as incredibly helpful, fulfilling, efficient, convenient, and enhanced financial control are going to adopt them, despite the perceived risks. On the contrary, increased risk perception undermines the usefulness evaluation by the users, thus reducing adoption intention. It traces the very essence of the Technology Acceptance Model, but it goes a step further and demonstrates that even perceived usefulness is a victim of the appraisal of threat. Risky digital space risks have users likely to discount expected benefits if it is felt that the losses of a risk will surpass expected benefits. Therefore, perceived usefulness is like a cognitive filter where perceived risk enters into the adoption decisions. The partial mediation effect demonstrates that usefulness does not have the capability of counteracting the perceived risk. Although functional benefits promote adoption, they have to be supported with plausible risk reduction strategies. This observation pushes the field of TAM forward in that perceived usefulness in high-risk situations can only be viewed as conditional, and that the inclusion of risk-oriented theories is essential to examine the use of FinTech.

The moderating role of digital literacy in perceived risk and behavioral intention, which is evidenced by the present study, can be considered among the strongest contributions of this study. The findings suggest that greater digital literacy reduces the negative effect of perceived risk on adoption intention. Digitally literate users are in a better position to identify security features, assess platform credibility, and adopt protective behaviors, hence less perceived vulnerability. In the view of PMT, digital literacy is a resource that acts as a buffer in inducing self-efficacy in users when dealing with digital threats. Even in the case of high risk perception, users who are more digitally competent tend to respond with adaptive coping behaviors in response to the risk instead of avoiding it. The observation highlights the significance of user capability as a boundary condition in models of technology adoption. In the end-user computing environment, this finding reflects heterogeneity in reaction to perceived risk by the user. The reaction to risk varies among users; instead, the reaction is influenced by personal competencies and experience. With the introduction of digital literacy as a moderator, this work offers a more detailed and realistic view of the tendency of digital behavior in the adoption of FinTech technology, and not just based on universal explanations.

6. Conclusion

This study aimed to describe the behavior of end-user computing in relation to FinTech adoption by combining TAM and PMT. In particular, it investigated the effect of perceived risk on behavioral intention to use FinTech services, considered the mediating factors of trust and perceived usefulness, and the moderating factor of digital literacy. The study builds a refined explanation of adoption decisions based on empirical evidence collected on the customers of banks in Pakistan by the joint contribution of threat appraisal, benefit evaluation, relational assurance, and individual capability. The results prove that perceived risk can be deemed as an important impediment to the adoption of FinTech that directly lowers the intention of users to use digital financial services. This adverse impact is not, however, absolute. The effect of perceived risk is partly transmitted by trust and perceived usefulness, which proves that perceived risk is cognitively and emotionally processed by users because of the perception of credibility and usefulness of the platform. Moreover, the coping resource of digital literacy becomes one of the most important, reducing the negative impact of perceived risk on adoption intention by increasing the confidence and self-efficacy of users in digital space navigation.

The study also contains some contributions to the body of literature in technology adoption and end-user computing. First, it contributes to the development of the adoption theory by combining TAM and PMT, proving that benefit and risk-oriented assessments co-exist and have a common effect on behavioral intention. This combination overcomes the long-standing criticisms of TAM that have a weak consideration of risk and PMT's underemphasis of perceived benefits, which offers a more reasonable explanatory framework. Second, the research builds on the Technology Acceptance Model by empirically proving that the usefulness in perception is an intervening variable as opposed to a pure exogenous determinant. This result emphasizes the fact that the perceptions of the benefits in turn depend on the risk appraisal, especially in the high-stakes digital setting of FinTech. Third, placing digital literacy as a moderating capability has enriched the PMT by demonstrating that responses to perceived threats are determined by the presence of individual resources to cope. Such a capability-based viewpoint both contributes to end-user computing research by focusing on the user heterogeneity and by going beyond one-size-fits-all adoption models. Lastly, the research also provides context-specific evidence when considering an emerging economy that assists in redressing a balance in the literature, which has been overtaken by evidence on developed markets. By so doing, it highlights the significance of institutional and capability factors in determining the results of digital adoption.

The results provide a number of practical implications for policymakers, financial institutions, and developers of FinTech. To policymakers and regulators, the findings help to highlight the significance of enhancing consumer protection frameworks and the public display of digital financial regulations enforcement. Institutional trust could be promoted by clear regulatory rules, transparent dispute-resolution processes, and awareness campaigns by the users, which would decrease perceived risk. In the case of FinTech companies and banks, the research points to the fact that trust-building strategies, in addition to functional innovation, should be selected as a priority. This involves the use of strong security measures, using a user-friendly language to communicate the privacy policies, and visible trust indicators like certifications, guarantees, and customer support systems. Increased perceived usefulness and adoption can be further promoted by emphasizing the practical benefits that include saving time, convenience, and low cost. The moderating effect of digital literacy implies that user education is an investment and not a peripheral activity. Banking institutions and government agencies are advised to work together to provide digital literacy training that enables users to develop skills in the area of use of FinTechs in a safe manner. These programs have the potential to make risk sensitivity less sensitive, build user confidence, and encourage a wide range of people to adopt them.

This study has a number of limitations, which give this research the chance to enhance future studies despite its contributions. First, the cross-sectional design restricts the possibility of making causal inferences. A longitudinal or experimental design could be used in future research to study the change in the perception of risks, trust, and digital literacy, and its impact on actual usage behavior. Second, the research was based on self-reported data that can be prone to social desirability bias or common method bias, even with the procedural and statistical remedies. To improve the measurement strength, future research may include behavioral or transaction-level data to supplement survey data. Third, the results cannot be generalized widely because of the narrow scope of the research on one emerging economy. Comparative research on developed and developing settings would shed more light on the dynamics of the adoption of FinTech within the context of institutional environments. Fourth, although the study rightly used all the important constructs in the TAM and PMT, the study has an opportunity to be expanded in the future by incorporating other constructs like perceived ease of use, social influence, or facilitating conditions. It might also be relevant to use the qualitative methods to develop a deeper insight into how risk and trust perceptions of users are influenced by cultural and contextual factors.

Reference

AbdulKareem, A.K. and Oladimeji, K.A., 2024. Cultivating the digital citizen: trust, digital literacy and e-government adoption. *Transforming Government: People, Process and Policy*, *18*(2), pp.270-286.

Abdul-Rahim, R., Bohari, S.A., Aman, A. and Awang, Z., 2022. Benefit–risk perceptions of FinTech adoption for sustainability from bank consumers' perspective: The moderating role of fear of COVID-19. *Sustainability*, *14*(14), p.8357.

Abdurrahman, A., 2025. Extending the IBCDE framework to explore barriers and drivers in Indonesia's digital economy. *Journal of Digital Economy*.

Alam, S.S., Ahsan, N., Kokash, H.A., Alam, S., and Ahmed, S., 2025. A student's behaviors in information security: Extension of Protection Motivation Theory (PMT). *Information Security Journal: A Global Perspective*, *34*(3), pp.191-213.

Aldboush, H.H. and Ferdous, M., 2023. Building trust in fintech: an analysis of ethical and privacy considerations in the intersection of big data, AI, and customer trust. *International Journal of Financial Studies*, *11*(3), p.90.

Almogren, A.S. and Aljammaz, N.A., 2022. The integrated social cognitive theory with the TAM model: The impact of M-learning in King Saud University art education. *Frontiers in Psychology*, *13*, p.1050532.

Al-Sharafi, M.A., Muhammed, I., Alzaeemi, S., Albashrawi, M.A., Chae, I. and Dwivedi, Y.K., 2025. Factors shaping FinTech adoption: A systematic review, key determinants, theoretical insights, conceptual framework and future research directions. *Information Discovery and Delivery*.

Anser, M.K., Naeem, M., Ali, S., Ali, S. and Javid, R., 2025. The relationship between artificial intelligence and environmental performance: the mediating role of external environmental factors. *Humanities and Social Sciences Communications*, *12*(1), pp.1-7.

Anser, M.K., Naeem, M., Ali, S., Ali, S. and Larik, A., 2025. Exploring the relationship between TMT behavioral integration and environmental performance in Pakistani SMEs: a study of green innovation, green dynamic capabilities, and green finance. *Humanities and Social Sciences Communications*.

Anser, M.K., Naeem, M., Ali, S., Huizhen, W. and Farooq, S., 2024. From knowledge to profit: business reputation as a mediator in the impact of green intellectual capital on business performance. *Journal of Intellectual Capital*, *25*(5/6), pp.1133-1153.

Anshori, M.Y., Karya, D.F. and Gita, M.N., 2022. A study on the reuse intention of E-commerce platform applications: security, privacy, perceived value, and trust. *Journal of Theoretical & Applied*, *15*(1), pp.14-24.

Appiah, T. and Agblewornu, V.V., 2025. The interplay of perceived benefit, perceived risk, and trust in Fintech adoption: Insights from Sub-Saharan Africa. *Heliyon*, *11*(2).

Bohio, K.K., Shaikh, F., Amin, M.S. and Naeem, M., 2025. From Green Policies to Performance: How Digitalization and Innovation Transform Organizational Outcomes in industry 4.0 of Pakistan. *Journal of Business and Management Research*, *4*(4), pp.800-816.

Bubeck, P., Osberghaus, D. and Thieken, A.H., 2023. Explaining changes in threat appraisal, coping appraisal, and flood risk-reducing behavior using panel data from a nation-wide survey in Germany. *Environment and Behavior*, *55*(4), pp.211-235.

Darmansyah, Fianto, B.A., Hendratmi, A. and Aziz, P.F., 2021. Factors determining behavioral intentions to use Islamic financial technology: Three competing models. *Journal of Islamic Marketing*, *12*(4), pp.794-812.

Elrayah, M. and Jamil, S., 2023. Impact of digital literacy and online privacy concerns on cybersecurity behaviour: The moderating role of cybersecurity awareness. *International Journal of Cyber Criminology*, *17*(2), pp.166-187.

Frank, D.A., Chrysochou, P., Mitkidis, P., Otterbring, T. and Ariely, D., 2024. Navigating uncertainty: Exploring consumer acceptance of artificial intelligence under self-threats and high-stakes decisions. *Technology in Society*, *79*, p.102732.

George, A.S., 2024. Finance 4.0: The transformation of financial services in the digital age. *Partners Universal Innovative Research Publication*, *2*(3), pp.104-125.

Goldenberg, J.L. and Arndt, J., 2008. The implications of death for health: a terror management health model for behavioral health promotion. *Psychological review*, *115*(4), p.1032.

Grover, V. and Lyytinen, K., 2015. New state of play in information systems research. *MIS quarterly*, *39*(2), pp.271-296.

Hamdani, A.I., 2025. Lived Experiences of Financial Risk and Uncertainty Among Novice Investors in Fintech Contexts. *Journal of Business, Management, and Accounting*, *1*(5), pp.203-210.

Hansen, J.M., Saridakis, G. and Benson, V., 2018. Risk, trust, and the interaction of perceived ease of use and behavioral control in predicting consumers' use of social media for transactions. *Computers in human behavior*, *80*, pp.197-206.

Ho, J.C., Wu, C.G., Lee, C.S. and Pham, T.T.T., 2020. Factors affecting the behavioral intention to adopt mobile banking: An international comparison. *Technology in Society*, *63*, p.101360.

Ho, S.M., Ocasio-Velázquez, M. and Booth, C., 2017. Trust or consequences? Causal effects of perceived risk and subjective norms on cloud technology adoption. *Computers & Security*, *70*, pp.581-595.

Huda, M., 2024. Trust as a key element for quality communication and information management: insights into developing safe cyber-organisational sustainability. *International Journal of Organizational Analysis*, *32*(8), pp.1539-1558.

Jafri, J.A., Amin, S.I.M., Rahman, A.A. and Nor, S.M., 2024. A systematic literature review of the role of trust and security on Fintech adoption in banking. *Heliyon*, *10*(1).

Jakobi, T., von Grafenstein, M., Smieskol, P. and Stevens, G., 2022. A Taxonomy of user-perceived privacy risks to foster accountability of data-based services. *Journal of Responsible Technology*, *10*, p.100029.

Joshi, S., Sharma, M., Bisht, P. and Singh, S., 2021. Explaining the factors influencing consumer perception, adoption readiness, and perceived usefulness toward digital transactions: online retailing experience of millennials in India. *Journal of Operations and Strategic Planning*, *4*(2), pp.202-223.

Kaur, S. and Arora, S., 2021. Role of perceived risk in online banking and its impact on behavioral intention: trust as a moderator. *Journal of Asia Business Studies*, *15*(1), pp.1-30.

Mujtaba, M., Naeem, M. and Khan, K., 2025. From Leadership to Performance: Exploring the Pathway through Psychological Empowerment and Job Satisfaction in Developing Economies. *Journal of Management & Social Science*, *2*(5), pp.166-183.

Naeem, M., Memon, S., Larik, A., Mehdi, S.R., Faridi, H.A., Khan, K., Zafar, S. and Kumar, M., 2026. Advanced Computational Intelligence and Climate Change Adaptation for Sustainability in SMEs of Pakistan: A New Paradigm for Business Resilience. In *Advances in Computational Intelligence for Climate Change Security and Sustainability* (pp. 1-20). IGI Global Scientific Publishing.

Naeem, M., Siraj, M., Ali, S., Rehman, A. and Farooq, S., 2025. The Role of Artificial Intelligence in Risk Management: Practices of the Banking Sector. In *Generative AI for Web Engineering Models* (pp. 83-106). IGI Global.

Ndukaji, A., 2025. Fintech and Financial Inclusion in Emerging Economies: Evidence From Digital Payments, Mobile Banking, and Entrepreneurial Finance. *Mobile Banking, and Entrepreneurial Finance (August 11, 2025)*.

Nguyen, T.T., Tran, T.N.H., Do, T.H.M., Dinh, T.K.L., Nguyen, T.U.N. and Dang, T.M.K., 2024. Digital literacy, online security behaviors and E-payment intention. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(2), p.100292.

Oehlschläger, D., Glas, A.H. and Eßig, M., 2024. Acceptance of digital twins of customer demands for supply chain optimisation: an analysis of three hierarchical digital twin levels. *Industrial Management & Data Systems*, *124*(3), pp.1050-1075.

Ogunola, A.A., Sonubi, T., Toromade, R.O., Ajayi, O.O. and Maduakor, A.H., 2024. The intersection of digital safety and financial literacy: Mitigating financial risks in the digital economy. *International Journal of Science and Research Archive*, *13*(02), pp.673-691.

Oladinni, A. and Odumuwagun, O.O., 2025. Enhancing cybersecurity in fintech: safeguarding financial data against evolving threats and vulnerabilities. *International Journal of Computer Applications Technology and Research*, *14*(1), pp.62-78.

Permana, I.B.G.A. and Setianto, D.P., 2019. The impact of task technology fit, system quality and information quality to user performance: Perceived ease usefullness and perceived ease of use as mediation. *International Journal of Organizational Innovation (Online)*, *12*(2), pp.335-340.

Perwitasari, A.W., 2022. The effect of perceived usefulness and perceived easiness towards behavioral intention to use fintech by Indonesian msmes. *Journal The Winners*, *23*(1), pp.1-9.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. Journal of applied psychology, 88(5), p.879.

Poppo, L., Zhou, K.Z. and Li, J.J., 2016. When can you trust "trust"? Calculative trust, relational trust, and supplier performance. *Strategic management journal*, *37*(4), pp.724-741.

Raut, R.K. and Kumar, S., 2024. An integrated approach of TAM and TPB with financial literacy and perceived risk for influence on online trading intention. *Digital Policy, Regulation and Governance*, *26*(2), pp.135-152.

Renn, O. and Benighaus, C., 2013. Perception of technological risk: insights from research and lessons for risk communication and management. *Journal of Risk Research*, *16*(3-4), pp.293-313.

Salganova, E.I. and Osipova, L.B., 2023. Students' digital literacy: Competence-based approach. *Economic and Social Changes: Facts, Trends, Forecast*, *16*(1), pp.227-240.

Shahab, S., Khan, K. and Naeem, M., 2025. The Power of Generative AI in Shaping Green and Responsible Supply Chains: Rethinking and Advancing Sustainable Solutions for Social Change. *Journal of Business and Management Research*, *4*(4), pp.800-817.

Shahzad, A., Zahrullail, N., Akbar, A., Mohelska, H. and Hussain, A., 2022. COVID-19's Impact on fintech adoption: Behavioral intention to use the financial portal. *Journal of Risk and Financial Management*, *15*(10), p.428.

Shaikh, F., Sial, A., Khan, K. and Naeem, M., 2025. FinTech-Enabled HR Payroll Automation and Its Effect on Employee Satisfaction and Brand Image. *Advance Journal of Econometrics and Finance*, *3*(4), pp.74-83.

Shaikh, M.R., Ali, M.I., Tunio, M.M.S.M. and Naeem, M.M., 2025. Green Human Resource Management and Sustainability Performance: A Systematic Review Using PRISMA Methodology. *Journal of Management & Social Science*, *2*(3), pp.330-344.

Sial, A., Khan, M.K. and Naeem, M.M., 2025. Green Finance, Business Reputation and Sustainability Performance: Evidence from Pakistan. *Bulletin of Management Review*, *2*(3).

Wei, N., Liang, Y., Wang, H. and Liu, M., 2025. Analysis of mobile fintech adoption based on perceived value and risk theory: findings from PLS-SEM and fsQCA. *Humanities and Social Sciences Communications*, *12*(1), pp.1-22.

Xia, H., Lu, D., Lin, B., Nord, J.H. and Zhang, J.Z., 2023. Trust in Fintech: Risk, governance, and continuance intention. *Journal of Computer Information Systems*, *63*(3), pp.648-662.

Xie, J., Ye, L., Huang, W. and Ye, M., 2021. Understanding FinTech platform adoption: impacts of perceived value and perceived risk. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), pp.1893-1911.

Zhu, G., Zheng, J., Du, H. and Hou, J., 2025. Insights into autonomous vehicles aversion: unveiling the ripple effect of negative media on perceived risk, anxiety, and negative WOM. *International Journal of Human–Computer Interaction*, *41*(14), pp.8684-8701.