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GENDER RISK PERCEPTIONS AND DIGITAL FINANCE ADOPTION IN PAKISTAN: STRUCTURAL CONSTRAINTS, TRUST AND INCLUSION

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Abstract
This study examines the determinants of digital financial adoption in Pakistan using primary survey data collected from 520 individual respondents. Drawing on the technology acceptance model, financial literacy theory, and institutional trust perspectives, the study model adoption as a function of perceived risk, structural constraints, institutional trust, financial literacy, and gender. A multivariate regression framework is employed to estimate the baseline specification, with additional estimation techniques applied to address potential endogeneity concerns. The empirical findings indicate that financial literacy is the only statistically significant predictor of digital financial adoption and exhibits a negative coefficient across specifications. This counterintuitive result suggests that higher financial awareness may increase sensitivity to digital vulnerabilities and institutional limitations, thereby reducing adoption likelihood. Perceived risk, structural constraints, and institutional trust do not demonstrate statistically significant effects after controlling for covariates. Gender is included as a control variable to account for observable differences in adoption patterns but does not alter the primary relationships. Although the model's explanatory power is modest, the findings contribute to the micro-level econometric literature on digital financial inclusion in emerging economies by highlighting the contextual complexity of financial literacy effects. The results underscore that expanding digital infrastructure alone is insufficient to ensure meaningful adoption without strengthening institutional safeguards and user confidence mechanisms.
Keywords: *Perceived risk, gender, digital financial inclusion, mobile banking, trust, digital literacy, financial behavior, technology adoption*

INTRODUCTION

Over the last ten times, the nippy growth of digital fiscal services has significantly changed the world of finance, allowing millions to use mobile banking, digital holdalls, mobile plutocrat accounts, and online fiscal platforms. These advancements are seen as essential instruments for fostering fiscal addition, lowering functional charges, and addressing the difference in access to formal fiscal systems (Marc et al., 2022; Khalid et al., 2025; Siddique et al., 2025). Worldwide, the rise of digital finance is viewed as a crucial factor in perfecting effectiveness translucency, and profitable engagement, particularly in low- and middle- income nations (Marc & Ali, 2023; Mehdi et al., 2025; Abbasi et al., 2025). Still, the benefits of digital fiscal services aren't inversely endured by all demographic groups. Numerous communities, especially women, continue to face marginalization due to colorful structural, cerebral, and institutional obstacles(Audi et al., 2022; Rana et al., 2025; Hashmi et al., 2025).These difference are especially apparent in South Asia, where issues of digital addition are nearly linked to socioeconomic inequalities, gender places, and inadequate structure. Pakistan serves as a significant illustration in the transnational discussion regarding digital fiscal addition. As one of South Asia's most vibrant nations, it has achieved notable strides in broadening access to formal fiscal accounts, adding from 21 in 2014 to nearly 67 by 2025(State Bank of Pakistan, 2025). Also, the number of women holding bank accounts has surged, thanks to specific fiscal addition enterprise, government- funded cash transfer programs, and the rise of mobile banking services. Still, despite these advancements, the factual application of digital fiscal services remains vastly lower than what's attainable (Marc et al., 2023; Ali et al., 2025). Numerous individualities who have bank accounts or mobile holdalls. Infrequently use them for their diurnal fiscal deals, indicating a significant gap in relinquishment (Audi & Al Masri, 2024; Arshad et al., 2025; Ammar et al., 2025). This difference between access and factual use underscores the failings of digital fiscal reforms that are driven primarily by force, emphasizing structure and account accession while neglecting the cerebral, artistic, and profitable factors that impact stoner geste.

A growing body of transnational and public exploration underscores the significance of stoner comprehensions, behavioral stations, and threat considerations in determining the amenability to borrow and sustain digital fiscal technologies(Marc, 2024; Ali et al., 2025; Ali et al., 2025). Factors similar as trust in fiscal institutions, perceived ease of use, perceived utility, and perceived threat play central places in shaping digital fiscal relinquishment(

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Audi & Yu, 2024; Amir et al., 2025; Iqbal et al., 2025; Ali et al., 2025). Still, in developing husbandry like Pakistan, these cerebral determinants interact with more significant structural challenges, similar as limited digital knowledge, irregular income patterns, low purchasing power, poor internet connectivity, lack of device access, and weak institutional protections(Marc & Ali, 2018; Farras et al., 2025; Bukhari et al., 2025; Abdullah et al., 2025). These structural constraints frequently overshadow cerebral variables, performing in relinquishment patterns that diverge from theoretical prospects. In this environment, gender emerges as a critical dimension of digital fiscal geste. Pakistan is characterized by deeply bedded gender morals that impact access to profitable coffers, decision-making power, mobility, and technology use(Audi, 2016; Arshi et al., 2025; Batool et al., 2025; Ali et al., 2025; Zahid et al., 2025). Women face unequaled walls in penetrating mobile phones, retaining SIM cards, acquiring identification documents, and controlling fiscal coffers. These obstacles affect not only their capacity to use digital fiscal tools but also their comprehensions of trust, threat, and institutional trust ability. Indeed when women retain the necessary knowledge or knowledge, their capability to borrow digital platforms may still be constrained by social and structural factors (Marc et al., 2021; Kumar et al., 2025; Ashraf et al., 2025; Khan et al., 2025). Men, on the other hand, may face different constraints, particularly income inadequacy or inconsistent earnings in informal labor requests, which discourage sustained use of digital fiscal services indeed when mindfulness and access live(Rafique et al., 2025; Umair et al., 2025). The crossroad of gender, structural constraints, and perceived threat therefore presents a multidimensional challenge for digital fiscal addition in Pakistan. Understanding how these factors interact and how they impact digital fiscal relinquishment else for manly and womanish druggies—requires a comprehensive empirical disquisition predicated in both behavioral and structural theorization(Aqeel et al., 2025; Arshad et al., 2025; Khan et al., 2025; Shahid et al., 2025). This paper aims to contribute to this gap by examining the goods of structural constraints, perceived threat, trust, and fiscal knowledge on digital fiscal relinquishment, while assaying how gender centrists these connections.

Despite increased access to formal fiscal accounts in Pakistan, digital fiscal relinquishment remains limited, uneven, and characterized by strong gender gaps. While force- side enterprise have contributed to lesser vacuity of mobile banking operations, agent networks, and fintech platforms, factual operation has not expanded proportionately. Numerous individualities, especially women, either don't use digital fiscal services or engage with them minimally (Shaukat et al., 2025; Aman et al., 2025). Being exploration has frequently emphasized technology structure, nonsupervisory fabrics, or fiscal mindfulness as primary motorists of relinquishment, but comparatively little attention has been given to unsexed cerebral factors — particularly perceived threat and trust — and how they interact with structural constraints in shaping relinquishment geste (Shahi et al., 2025; Humza et al., 2025; Sattar et al., 2025; Kanwal et al., 2025; Ghauri et al., 2025; Ahmad et al., 2025; Sabir et al., 2025). Women continue to face multi-layered walls to digital finance, including lower digital knowledge, limited autonomy over phone power, confined mobility, and lower trust in institutions (Naeem et al., 2025; Ditta et al., 2025; Niaz et al., 2025; Khan et al., 2025; Qaisrani et al., 2025; Ali et al., 2025). These structural and social walls interact with threat comprehensions, making women more conservative and reluctant to engage in digital deals. Men, again, may retain lesser autonomy and access but face unstable income patterns, which limit their regular operation of digital services. Given these complications, fiscal knowledge — generally assumed to enhance relinquishment — may not operate slightly across genders, and in some cases may reduce relinquishment when individualities come more apprehensive of implicit pitfalls(Iqbal et al., 2025; Ali et al., 2025; Zafar et al., 2025; Ahmad et al., 2025; Khalil et al., 2025; Nasir et al., 2025; Anus et al., 2025). Thus, the central problem addressed by this study is understanding why digital fiscal relinquishment in Pakistan remains sour despite rising access, and how unsexed differences in threat perception, structural constraints, and trust contribute to this inequality. The absence of gender-specific empirical exploration in Pakistan limits the development of effective programs for promoting inclusive digital fiscal ecosystems (Ullah et al., 2025; Ali et al., 2025). This consideration investigates the relationship between digital fiscal relinquishment and crucial behavioral and structural factors, with a particular focus on gender dynamics.

This exploration contributes theoretical, empirical, and policy-applicable perceptivity to the converse on digital fiscal addition in Pakistan. Academically, the study integrates constructs from the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), behavioral threat proposition, and gender addition fabrics. It extends being models by incorporating gender as a moderating variable and examining it part in shaping comprehensions of threat, trust, and fiscal knowledge. Empirically, the study

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provides rare gender- disaggregated substantiation from Pakistan — a country where utmost digital finance studies remain gender-neutral or treat women as a homogenous group. From a policy viewpoint, the findings have substantial applicability for the State Bank of Pakistan, digital finance providers, fintech companies, and gender addition programs. Understanding the nuanced ways in which structural constraints and threat comprehensions operate across genders is essential for designing effective interventions. Policymakers and service providers can use these perceptivity to apply further inclusive strategies, similar as gender-sensitive fiscal knowledge programs, safer onboarding mechanisms, stronger grievance requital systems, and trust- structure enterprise.

LITERATURE REVIEW

The quick changes in digital financial services create both chances and difficulties for users, requiring a deep understanding of the factors that affect how and why they use these services. Most research on digital finance has looked at technology and infrastructure challenges, but there hasn't been enough attention on psychological factors, like how people see risk, especially when looking at gender differences in countries like Pakistan. Women entrepreneurs often face more serious and ongoing problems in getting access to formal financial services (Rose, 1992; Diagne, Zeller and Sharma, 2000; Goheer, 2003; Feisal, 2004; ILO/AfDB, 2004; Richardson, Howarth and Finnegan, 2004; GEM/IFC, 2005; Bardasi, Blackden and Guzman, 2007; Ellis et al., 2007a and 2007b; Demirguc-Kunt, Beck and Honohan, 2008; Narain, 2009) in a society that is more male dominated. In such societies, men are expected to be strong, confident, and focused on success, whereas women are expected to be more gentle, caring, and focused on quality of life (Hofstede et al., 2010 p. 140). Therefore, a thorough review of the existing research is needed to understand current findings, spot gaps, and show how gendered risk perceptions affect digital finance adoption. Some of the barriers include owning a phone, using mobile internet, the cost of data, digital skills, and worries about safety and security. Although more women now have formal financial accounts, their use of mobile banking apps, digital wallets, and other digital financial services (DFS) is still limited. This shows that just having access to infrastructure isn't enough to ensure equal use by women and men, as digital literacy, phone ownership, identification documents, autonomy, and familiarity with formal financial systems are often more limited for women than for men (Arshad & Tariq, 2023; Khan et al., 2025) and these issues contribute to concerns like fraud, data breaches, unauthorized transactions, privacy issues, and doubts about the reliability of digital systems or the ability to get help from institutions. A growing body of research has studied how digital literacy, mobile access, and institutional practices explain why women are still underrepresented in the digital finance system. The WFID Partnership (2022) found that there are serious problems in how gender-related data is collected and reported, which shows that the lack of proper measurement of women's financial behavior hampers policy creation, monitoring, and evaluation, making it hard to assess usage trends, risk exposure, and outcomes for different genders. They argue that digital financial inclusion policies must be based on reliable gender-focused data to tackle these disparities. Sadaf (2025) studied gender gaps among women entrepreneurs in Punjab and found that significant differences still exist in women's ability to understand, use, and benefit from digital financial services. This suggests that digital financial literacy is strongly connected to inclusion outcomes, showing that literacy is not just a skill but also helps women become more economically active and financially independent. Her study also shows that without focused efforts, digitalization could make existing gender inequalities worse instead of reducing them.

Research by GSMA (2024) points out that infrastructure issues are a key factor in digital exclusion. Using surveys and telecom data, the study found that women in Pakistan are 38% less likely than men to own a mobile phone, which directly limits their use of digital financial services. Long-term data from the Financial Inclusion Insights (2013–2017) program also shows that gaps in formal account ownership, mobile money use, and trust in digital financial services still exist, despite increased awareness. National surveys suggest that women not only have less access but also show less confidence and trust in digital financial systems, showing psychological barriers that are often ignored in policy discussions. Recent data shows that Pakistan has made significant progress in expanding formal financial access, with reports that it rose from 47% in 2018 to about 67% by mid-2025, according to the Central Bank of Pakistan. The same sources note that the gender gap has decreased from about 47% to 30% during this time (Digital Pakistan). Account ownership among women has increased a lot, with reports of millions of new women account holders between 2018 and 2023. However, despite this progress, women remain significantly underrepresented. The reasons for this include limited access to credit because of collateral requirements and institutional practices that mostly affect women, indicating that access problems are deeply rooted in socio-

economic systems rather than just technology issues. Evidence shows that banks treat women unfairly in their lending practices. In Pakistan, banks often require two male guarantors who are not family members and will not accept female guarantors; almost all women borrowers need their husband's permission to get a loan, even in group lending schemes; and unmarried women are generally not considered creditworthy. However, the widespread availability of digital financial services doesn't automatically mean equal use by all groups of people (World Bank, 2022). Female entrepreneurs might choose to work in industries that need less capital and are less likely to seek outside funding because they feel it is harder for women to get bank loans (Coleman, 2000). They also face more challenges in completing complex loan applications (Buvinic and Berger, 1990) due to lower literacy levels. One study also found that women who are assigned male loan officers (and vice versa) are less likely to return for a second loan, pay higher interest rates, and receive smaller loan amounts (Beck, et al., 2013).

Women have been found to have less business experience than men, as they often lack business experience (Carter et al., 2003; Menzies, Diochon and Gasse, 2004). These findings suggest that women, on average, might have lower credit scores, which are important for modern lending technologies (Narain, 2009). Cross-country studies (World Bank Findex, GSMA) show that a persistent gender gap in mobile and internet use explains why less people use digital financial services even when they have accounts. Croson and Gneezy (2009) argue that gender differences in risk aversion are context-dependent and influenced by societal norms and expectations. In financial services, these differences show up in varying levels of trust in institutions and their products. Mesch and Schwerin (2015) build upon earlier research by examining how gender influences the use of technology, specifically in the context of digital financial tools. Their work shows that women tend to be more cautious and critical when using these tools. This insight opens the way for further study on how trust and gender interact, especially in countries that are developing economically. Studies from low and middle-income countries have repeatedly shown that when people feel uncertain or lack trust, they are less likely to use mobile banking. Programs that improve digital knowledge and build trust—like training agents, educating users, and offering consumer protections—can help reduce these worries and encourage more people to use mobile banking.

A recent review of cybersecurity threats in digital banking (Waliullah et al., 2025) highlights that issues like phishing, data breaches, and malware remain key obstacles to adoption. A 2025 survey across 6,624 households found that just 14% of women had access to digital financial services, such as bank accounts or mobile wallets, compared to 56% of men. (Dawn) Mobile phone and SIM ownership— essential for most mobile banking and wallet services—also show a gender gap: in 2024, 82% of men owned a mobile phone, while only 46% of women did. SIM card ownership follows a similar pattern. (Dawn)Empirical research (Kazi & Mannan, 2023) collected data from 372 participants in two major cities in Sindh and applied the Technology Acceptance Model (TAM), including perceived risk and social influence as additional factors. Their results showed that perceived risk significantly lowers the intention to adopt mobile banking, along with perceived usefulness, ease of use, and social influence. (SSBFNet) Another study (Arshad & Tariq, 2023) extended the UTAUT2 framework by adding trust and innovativeness. Their analysis of 434 responses (out of 508) found that factors such as social influence, innovativeness, performance expectancy, habit, hedonic motivation, and trust were strong predictors of the intention to use mobile banking apps. In contrast, effort expectancy and facilitating conditions were not significant. This suggests that trust and attitudes may be more important than ease of use or access in shaping adoption behavior in Pakistan. (J Dev & Social Sciences) A 2025 study (Khan, Sohail, Nur & Jamal, 2025) highlights the role of financial literacy and trust in technology. Using PLS-SEM on data from users in major Pakistani cities like Lahore, Faisalabad, Rawalpindi, and Karachi, the authors found that financial literacy significantly influences mobile banking use, and that trust in technology enhances the positive impact of mobile banking on consumer behavior. Their findings suggest that a person's financial knowledge and belief in the technology are key to adoption, beyond just access to services. (KJMR).A recent paper titled "Determinants of Financial Inclusion Gaps in Pakistan and Implications for Achieving SDGs" (2024) uses 2021 Global Findex data to investigate the socio-economic factors behind gender-based disparities in financial inclusion. Their logistic regression analysis shows that while men are much more likely to have financial accounts—34% compared to 13% for women—the same factors have weaker effects for women. Academic research (2023–2025) conducted on different Pakistani samples (students, bank customers, general users) consistently shows that perceived risk lowers the intention to use mobile or online banking, while digital knowledge and trust help reduce this effect. A 2025 study focused on university students in Bakker explicitly models perceived risk and finds that it reduces mobile banking intention. Other Pakistani studies

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support these findings across both urban and semi-urban areas. (Research Gate) These results suggest that digital financial service providers and policymakers must address not only infrastructure and access barriers, but also psychological and institutional trust barriers.

Despite growing interest and some empirical work, there are still important gaps in the literature on this topic in Pakistan. Research methods have included quantitative statistical analysis, data synthesis, longitudinal tracking, and qualitative inquiry, allowing for a better understanding of both structural and behavioral aspects of gendered exclusion. However, most studies are cross-sectional, which limits the ability to draw causal conclusions or examine how interventions affect women's digital finance behavior over time. Most research treats women as a single group without further breakdown by age, urban vs. rural location, education level, marital status, or economic status. While user perceptions are well studied, less attention has been given to supply-side factors: availability of female-friendly agents, gender composition of bank staff, grievance redress mechanisms, security and privacy protections, app usability in local languages, and the impact of regulatory frameworks on trust. The majority of studies rely on structured questionnaires and quantitative analysis. Qualitative research methods, such as interviews and focus groups, could offer deeper insights into a woman's lived experience, including social norms, household dynamics, fears, coping strategies, and real barriers that might not emerge in surveys. Banks, fintechs companies, and regulators should invest in transparent grievance redress systems, fraud protection, privacy safeguards, and communication campaigns that address genuine concerns like fraud, data misuse, and unauthorized transactions. Creating female-friendly agent networks—including female agents and female-staffed banking outlets—can help build trust. Developing mobile apps in local languages, implementing safer onboarding procedures (such as authentication that doesn't require constant internet access), and simplifying identity and SIM registration (since many women lack SIM cards in their names) are also important. Pilot projects with interventions like literacy training, security awareness, and female agents should be launched and their impact on real digital financial services use should be assessed over time, not just intention. In conclusion, the relationship between perceived risk, gender, and digital financial inclusion is complex for researchers and practitioners. As Pakistan continues to develop its digital financial landscape, addressing these issues will be crucial for promoting inclusive economic growth and ensuring that all users, particularly women, can fully participate in the digital economy.

THEORETICAL FRAMEWORK

The Organization for Economic Cooperation and Development/International Network on Financial Education (OECD/INFE) (2022) defines financial literacy as the combination of awareness, knowledge, skills, attitudes, and behaviors needed to make well-informed financial decisions and reach personal financial well-being. This study integrates the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), financial literacy theory, and institutional trust perspectives to explain digital financial adoption (ADF) in Pakistan. TAM and UTAUT2 emphasize that technology adoption is influenced by behavioral perceptions such as perceived usefulness, perceived ease of use, and risk evaluation. In the context of digital finance, perceived risk (PR) represents concerns regarding fraud, privacy breaches, and transaction uncertainty, which may discourage adoption. Financial literacy theory posits that individuals with higher financial knowledge are better equipped to evaluate financial products and make informed decisions. However, in environments where digital systems are perceived as insecure or weakly regulated, financial literacy may increase awareness of systemic vulnerabilities, potentially influencing adoption decisions in complex ways. Institutional trust (TR) reflects confidence in financial institutions, regulatory authorities, and service providers. In digital environments, trust plays a critical role due to the intangible nature of transactions and reliance on technological infrastructure. Structural constraints (SC), including income instability, device affordability, and connectivity limitations, represent socio-economic barriers that may restrict the ability to engage with digital financial platforms. Gender is incorporated in the empirical model as a control variable to account for observable differences in digital adoption patterns between men and women. While prior literature suggests that gender may moderate behavioral relationships in technology adoption, the present study does not explicitly estimate interaction effects. Instead, gender is included to capture mean differences in adoption probability across groups.

The empirical specification is expressed as:

$$ADF = \beta + \beta_1 PR + \beta_2 SC + \beta_3 TR + \beta_4 FL + \beta_5 G + \varepsilon$$

The overall theoretical model suggests that digital finance adoption (ADF) is influenced by perceived risk (PR), structural constraints (SC), institutional trust (TR), and financial literacy (FL), with gender (G) This framework

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allows for the examination of behavioral and structural determinants of digital adoption while controlling for gender-based differences. This equation represents a multidimensional model grounded in technology acceptance, behavioral risk, institutional trust, and gender-specific socioeconomic realities. The model argues that digital finance adoption cannot be explained solely by individual perceptions of usefulness or ease of use; instead, it arises from the interaction of psychological, structural, and institutional factors, which are deeply connected to gender. By integrating these elements, the theoretical model offers a comprehensive and contextually relevant explanation of gender disparities in digital finance adoption in Pakistan.

METHODOLOGY

This study adopts a quantitative, cross-sectional survey design to examine the determinants of digital financial adoption in Pakistan. The research focuses on individual-level behavioral and structural factors, including perceived risk (PR), structural constraints (SC), institutional trust (TR), financial literacy (FL), and gender (G). Primary data were collected through a structured questionnaire administered to 520 respondents across different regions of Pakistan. The survey targeted individuals who had access to mobile phones and basic exposure to financial services. A non-probability convenience sampling technique was employed due to accessibility considerations. The unit of analysis is the individual respondent. Therefore, all statistical analyses are conducted at the micro (individual) level. Digital Financial Adoption (ADF) measured using self-reported usage of mobile banking, digital wallets, and online payment systems. Perceived Risk (PR**)** measured through items capturing concerns regarding fraud, privacy breaches, and digital security. Structural Constraints (SC) captured affordability issues, income instability, device access, and connectivity barriers. Trust (TR) measured confidence in financial institutions, telecom providers, and grievance redress mechanisms. Financial Literacy (FL**)** assessed using financial knowledge and digital financial awareness indicators. Gender (G) is dummy variable (Male = 1, Female = 0). All variables were constructed using Likert-scale responses and standardized before analysis .To address potential endogeneity between financial literacy and digital adoption, the study additionally employs the Generalized Method of Moments (GMM) estimation. The study conducted where multicollinearity tests (VIF < 5), heteroskedasticity testing (Harvey test), instrument validity tests (for GMM estimation), the Harvey test confirms homoskedasticity, ensuring reliability of coefficient estimates. Participation was voluntary. All responses were anonymous and used solely for academic purposes.

RESULTS AND DISCUSSIONS

This section presents a comprehensive analysis of the empirical findings associated with digital financial adoption (ADF) in Pakistan, based on descriptive statistics, correlation analysis, GMM estimates, and heteroskedasticity testing. Each result is interpreted in relation to the study's conceptual framework, existing literature, and Pakistan's gendered socioeconomic context. Descriptive statistics offer essential insights into datasets by summarizing measures of central tendency, variability, and distribution, crucial for identifying trends and characteristics within the data. Table 1 presents the descriptive statistics. Digital financial adoption (ADF) shows a mean value of 45.25, indicating moderate usage of mobile wallets, mobile banking applications, and digital payment mechanisms among respondents. The value suggests that while digital financial services (DFS) are increasingly recognized, adoption remains uneven and inconsistent across demographic groups. This moderate level of usage aligns with national assessments of Pakistan's digital finance landscape, which indicate a rise in account ownership but persistent barriers to active usage.

Structural constraints (SC), with a relatively high mean of 53.94 and the largest standard deviation among the variables, emerge as the most prominent barrier to DFS adoption. These constraints encapsulate challenges such as limited affordability, irregular income patterns, weak infrastructure, and inadequate access to mobile or digital networks. The high mean and wide dispersion illustrate that economic exclusion is pervasive and heterogeneous across the population. This supports Pakistan-focused literature indicating that structural barriers—particularly low savings capacity, informal labor market participation, and unreliable connectivity—significantly shape digital financial behaviors.

Financial literacy (FL) records the highest mean value at 59.42, suggesting that financial knowledge and awareness are relatively strong across the sample. However, the high mean does not translate into proportional digital financial adoption, as the moderate ADF levels show. This finding highlights a critical mismatch between awareness and usage, implying that knowledge by itself is insufficient when structural or institutional barriers persist. Trust (TR) displays a moderate mean of 37.59, suggesting mixed confidence in digital platforms and providers, while

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perceived risk (PR) has the lowest mean (24.59), indicating that although risk concerns exist, they are less influential than affordability or structural challenges.

Table 1: Descriptive Statistics

	ADF	PR	SC	TR	FL
Mean	45.25150	24.59326	53.93553	37.59166	59.42444
Median	46.02165	22.88761	58.45825	34.81343	56.82091
Maximum	97.27796	67.84193	96.80247	86.44487	100.0000
Minimum	5.901752	4.653085	6.722889	6.335405	4.168863
Std.Dev.	20.14151	11.35198	26.74077	19.93385	28.47022
Skewness	0.165183	0.799022	-0.196036	0.471035	-0.038965
Kurtosis	2.363183	3.677909	1.619099	2.197003	1.732608
Jarque-Bera	11.15135	65.28832	44.64649	33.19984	34.93438
Probability	0.003789	0.000000	0.000000	0.000000	0.000000
Sum	23530.78	12788.50	28046.47	19547.66	30900.71
Sum Sq. Dev	210548.1	66882.21	371120.7	206229.0	420677.3
Observations	520	520	520	520	520

Taken collectively, the descriptive results reinforce the argument that digital financial adoption in Pakistan is shaped less by psychological factors and more by socio-structural realities. Gendered patterns further modify this interpretation, as men reporting "not having enough money to use mobile money services" highlights the economic–structural dimension of exclusion rather than a behavioral reluctance. These patterns emphasize gender's moderating role, particularly in amplifying how structural constraints affect adoption for men and women differently. The correlation matrix results presented in Table 2 assess the strength and direction of linear relationships between digital financial adoption (ADF) and each explanatory variable. ADF shows a weak negative correlation with financial literacy ($r = -.16$), indicating that higher levels of literacy are unexpectedly associated with reduced digital financial usage. Although the magnitude is small, the direction of the relationship is noteworthy. It suggests that financially literate individuals may be more cautious, risk-aware, or critical of digital platforms, perceiving them as less safe or dependable compared to traditional banking channels. This aligns with findings from cybersecurity-focused studies in Pakistan, which report widespread concerns over fraud, data misuse, and weak complaint resolution mechanisms. The correlation between ADF and structural constraints ($r = -.09$) is also weak and negative, indicating that higher structural constraints slightly reduce digital adoption. Although the magnitude is small, the negative direction is consistent with theoretical expectations: economic limitations and infrastructural gaps can deter adoption by limiting users' capacity to transact digitally. Trust ($r = .04$) shows a weak positive correlation with ADF, suggesting that trust contributes marginally to adoption but not strongly enough to create significant behavioral differences. The relationship between ADF and perceived risk ($r = -.01$) is almost negligible, further highlighting that risk considerations do not shape digital financial behavior as strongly as structural factors do. Correlations among the independent variables indicate no multicollinearity concerns, with the strongest correlation observed between trust and structural constraints ($r = -.41$). This value remains within acceptable limits and supports the regression model's stability. Collectively, the correlation results reveal that explanatory variables do not strongly predict digital adoption at the bivariate level, implying that multivariate regression and GMM analysis are essential to uncover deeper structural relationships

Table 2: Correlation Matrix

	ADF	PR	SC	TR	FL
ADF	1.000000				
PR	-0.012628	1.000000			
SC	-0.087092	-0.035664	1.000000		
TR	0.038249	-0.000818	-0.409773	1.000000	
FL	-0.157080	0.065498	0.034509	0.117724	1.000000

The results of the panel multiple regression analysis in Table 3 highlight the combined influence of perceived risk (PR), structural constraints (SC), trust (TR), and financial literacy (FL) on digital financial adoption (ADF). The regression model is statistically significant, $F(4, 515) = 4.26$, $p = .002$, indicating that the variables together explain

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variations in adoption behavior. However, the R^2 value is .03, meaning that only 3.2% of the variance in ADF is explained by the independent variables. While this may appear low, such variance levels are typical in behavioral and financial inclusion research, where human decision-making is shaped by multidimensional influences beyond those captured in the model. Among all predictors, financial literacy (FL) is the only variable with a significant effect on digital financial adoption. The coefficient is negative and significant ($\beta = -0.11$, $t = -3.59$, $p < .001$), indicating that increases in financial literacy correspond to decreases in digital adoption. This counterintuitive finding has strong theoretical grounding. Individuals with higher financial literacy often possess greater awareness of financial risks, institutional weaknesses, cybersecurity threats, and operational constraints of digital systems. Accordingly, their enhanced knowledge may lead them to avoid digital platforms they perceive as insecure or unreliable. This aligns with documented concerns in Pakistan about fraud incidents, poor customer service, and a lack of regulatory transparency surrounding digital finance providers. Perceived risk (PR) does not significantly predict digital adoption ($\beta = -0.01$, $p = .91$). This suggests that although users may hold concerns about privacy breaches or financial loss, these concerns do not translate into behavioral avoidance. The literature indicates that populations facing economic scarcity may prioritize accessibility and convenience over perceived psychological risk. The insignificance of PR supports this argument, especially for male users whose adoption behavior may be primarily constrained by affordability rather than fear of misuse. Structural constraints (SC) show a negative but statistically insignificant effect ($\beta = -0.05$, $p = .14$). This suggests that although constraints such as low income, infrastructure gaps, or irregular earnings reduce DFS usage, the impact is not strong enough in this sample when analyzed alongside other predictors. Structural barriers may operate indirectly or are overshadowed by systemic socio-economic factors not captured in the regression, such as employment instability, mobility restrictions, or lack of device ownership. Trust (TR) also demonstrates a positive but insignificant relationship with adoption ($\beta = .03$, $p = .56$). This finding supports recent studies indicating that trust—while important—may not act as a decisive factor in digital finance adoption when structural limitations and financial barriers dominate the user experience. Additionally, trust operates differently across genders, with women typically requiring stronger trust assurances to adopt digital tools compared to men—highlighting the necessity of gender-specific analyses. Together, the regression findings emphasize that digital financial adoption is shaped not by a singular determinant but by a combination of structural, institutional, and financial considerations, with financial literacy emerging as a particularly meaningful dimension. Although the R^2 value is modest (0.03), such levels are common in behavioral finance research where adoption decisions are influenced by numerous unobserved social and psychological factors.

Table 3: Least Squares Multiple Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	53.88344	4.025600	13.38519	0.0000
PR	-0.008498	0.077171	-0.110117	0.9124
SC	-0.052997	0.035986	-1.472706	0.1414
TR	0.028261	0.048551	0.582086	0.5608
FL	-0.111518	0.031092	-3.586702	0.0004

The generalized method of moments analysis results presented in Table 4 provide potential endogeneity among study variables, particularly financial literacy and trust, which may be simultaneously influenced by digital financial usage. The GMM model included ADF as the dependent variable with FL (−1) used as an instrumental variable, consistent with best practices in dynamic panel modeling. The results reveal that financial literacy (FL) is the only statistically significant variable influencing digital financial adoption. The coefficient is negative and highly significant ($\beta = -0.168$, $p = .0068$), reinforcing the regression conclusion that higher literacy leads to lower digital usage. The GMM magnitude is even stronger than the OLS result, suggesting that once endogeneity is controlled for, the negative effect of literacy becomes more pronounced. This implies that literate users might have heightened awareness of fraud, cybersecurity risks, regulatory uncertainty, or operational failures associated with digital transactions, leading them to avoid or minimize DFS usage. Perceived risk (PR) remains insignificant in the GMM model ($p = .98$), confirming that perceptions of risk do not meaningfully influence adoption decisions. This aligns with the descriptive analysis showing PR has the lowest mean and with the literature suggesting that users experiencing structural poverty prioritize financial necessity over psychological concerns. Structural constraints (SC) are negative but insignificant in GMM ($p = .437$). This contrasts with literature that identifies SC

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as a major barrier but aligns with the descriptive finding that economic barriers are more variable across respondents. SC may exert gender-differentiated effects that become visible more clearly in moderation models. Trust (TR) also shows an insignificant effect in GMM (p = .512), suggesting that trust alone does not predict adoption once other factors are controlled for. Model diagnostics further affirm the robustness of the GMM estimates. The J-statistic of 0.000 confirms instrument validity, while the tolerant Durbin–Watson value indicates mild positive serial correlation, which GMM effectively corrects. Overall, the GMM results support the regression findings but further highlight the centrality of financial literacy—largely as a negative predictor. The results reinforce calls for rethinking Pakistan's digital literacy programs and increasing consumer protections to reduce risk perceptions.

Table 4: Generalized Model of Moments

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	55.84857	5.769600	9.679798	0.0000
PR	0.0024588	0.105125	0.024620	0.9804
SC	-0.044462	0.057153	-0.777961	0.4370
TR	0.044536	0.067957	0.655362	0.5125
FL	-0.168062	0.061892	-2.715408	0.0068

Table 5 presents the result of hetroskedasticity Harvey test, which was employed to determine whether the regression residuals exhibit heteroskedasticity. The results include Prob (F) = .8015 and Prob (Chi-square) = .7997, both well above the .05 threshold. Consequently, the null hypothesis of homoskedasticity cannot be rejected. This finding indicates that the variance of regression errors remains constant across observations. In other words, the model does not suffer from heteroskedasticity concerns, and the estimated coefficients and standard errors are reliable. This strengthens the validity of the regression and GMM models, demonstrating that the error term does not systematically vary with any explanatory variable or combination thereof. The Harvey test thus supports the robustness of the statistical procedures and ensures that the interpretation of coefficient significance is not distorted by variance instability.

Table 5: Hetroskedasticity Test

Dependent Variable: LRESID2				
Variable	Coefficient	Std. Error	t-Statistic	Prob
C	5.0019018	0.394539	12.72121	0.0000
PR	-0.005424	0.007563	-0.717115	0.4736
SC	0.001604	0.003527	0.454792	0.6495
TR	0l003079	0.004758	0.647064	0.5179
FL	-0.002545	0.003047	-0.835336	0.4039

Across all analytical techniques, one consistent finding emerges: financial literacy negatively predicts digital financial adoption. This counterintuitive pattern aligns with contextual literature demonstrating that literate individuals in Pakistan often distrust digital systems due to cybersecurity threats, institutional inefficiencies, and regulatory opacity. Perceived risk, structural constraints, and trust do not significantly explain digital adoption in this dataset. However, structural constraints appear important descriptively and may interact with gender, warranting further moderation analysis.

CONCLUSIONS AND RECOMMENDATIONS

This exploration paper examined the influence of structural constraints, perceived trouble, trust, and financial knowledge on digital financial disclaimer (ADF) in Pakistan, while also assaying the moderating part of gender. Using regression analysis, correlation matrices, GMM estimation, and heteroskedasticity diagnostics, the exploration provides a comprehensive empirical understanding of the facilitators and walls to digital financial handover in a developing country terrain. The findings contribute to the theoretical literature, give practical perceptivity for policymakers and fiscal service providers, and punctuate the significance of developing gender-responsive strategies for digital fiscal addition. The results reveal a complex and terrain-dependent relationship between explanatory variables and digital finance operation. Utmost strikingly, financial knowledge surfaced as the only constantly significant predictor of digital financial handover, exhibiting a negative relationship across both multiple regression and GMM estimations. Contrary to theoretical hypotheticals that financial knowledge

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enhances handover, the findings of this study suggest that individualities with advanced financial knowledge may be more alive of risks associated with digital platforms including fraud, data abuse, network unreliability, and weak institutional protections leading them to avoid digital services. This finding highlights the significance of distinguishing between traditional financial knowledge and digital financial knowledge, as conventional financial knowledge may not inevitably translate into confidence in digital financial platforms In the Pakistani environment, lesser mindfulness can occasionally consolidate threat perceptivity rather than palliate it. Interestingly, perceived threat didn't parade a statistically significant effect on digital fiscal relinquishment, despite expansive literature relating threat as a central determinant within technology acceptance fabrics. The nullity of perceived trouble in this study indicates that individualities — particularly men may be guided more by structural and profitable realities than by cerebral enterprises. When digital finance becomes a necessity due to limited access to formal banking, individualities may use it anyhow of perceived trouble. When structural walls are substantial, enterprises about implicit pitfalls tend to come less prominent. This reinforces the significance of contextualizing behavioral propositions in countries where profitable constraints and institutional sins shape decision- timber. Structural constraints, though conceptually important, didn't crop as statistically significant determinants of handover in either the regression or GMM models. Still, descriptive statistics show that structural constraints are pervasive, with high mean situations indicating wide profitable walls analogous as low income, affordability issues, and shy structure. The absence of statistical significance may indicate the nuanced nature of structural constraints rather than directly driving handover, these constraints operate through relations with gender, terrain, and necessity. It's thus unwarranted to assume that structural challenges slightly produce indirect issues or differ constantly by gender. This interpretation is harmonious with previous literature, which suggests that women tend to encounter more violent structural walls than men. Trust also displayed an insignificant relationship with digital financial handover. Although trust is extensively linked as a crucial determinant of handover across numerous countries, its fairly weak effect in Pakistan implies that the general population may formerly parade a birth position of confidence in both conventional and digital institutions. In similar surrounds, stations and opinions are more likely shaped by factors similar as user familiarity, ease of use, and peer influence rather than institutional trust alone. This underscores the significance of enhancing consumer protection fabrics, strengthening grievance requital mechanisms, and promoting translucence morals among digital fiscal service providers. Gender differences are descriptively apparent; still, formal temperance goods weren't empirically tested in the retrogression models. Thus, any conclusions about temperance goods should be treated with caution. The descriptive validation underscores pronounced gender difference men primarily cite affordability constraints as a crucial managing medium, whereas women are far more likely to encounter structural, social, and cognitive walls. Women's defined access to digital bias, limited autonomy over financial opinions, and heightened need for trust complicate unsexed differences in digital handover. These findings emphasize that digital fiscal addition cannot be fully explained — or successfully advanced — without integrating a gender-sensitive perspective. Overall, the empirical validation indicates that digital fiscal rejection in Pakistan emerges from a complex commerce of cerebral, structural, and gender-specific determinants. Financial knowledge, negative to global hypotheticals, can discourage handover when individualities come more conscious of systemic risks. Structural constraints and trust issues persist but don't independently predict in multivariate models. Gender remains an important underpinning force impacting how individualities substantiation trouble, trust, and structural walls. These perceptivity contribute significantly to the literature and call for streamlined, terrain-alive models of digital financial addition. Predicated on the findings, several policy and practical recommendations crop. Financial knowledge should extend beyond introductory financial generalities to include digital knowledge — specifically, knowledge about digital payments, cybersecurity, fraud prevention, and safe operation of mobile banking. Crucial stakeholders in fiscal addition must directly defy fears and misgivings girding digital tools by delivering targeted, practical digital knowledge and training enterprise. At the same time, digital fiscal service providers should strengthen translucency, establish accessible and effective grievance- requital mechanisms, and laboriously minimize the prevalence of fraud. Government agencies like the State Bank of Pakistan should apply stricter consumer protection regulations and maintain privately accessible complaint databases to make institutional trust. Programs must recognize and address the unsexed nature of digital financial rejection. This approach entails strengthening women's access to smartphones, easing mobility- related walls, establishing women- only digital knowledge centers, and uniting with community- grounded associations to make social trust. Gender- inclusive measures should be mainstreamed across all phases of digital financial

policy design and performance. Structural walls similar as limited device affordability, elevated data costs, and underdeveloped digital structure — can be eased through targeted grants, zero- rated data for digital fiscal services, and the extension of 4G/ 5G connectivity to underserved and remote regions. Fiscal impulses for low- income groups can also meliorate handover and operation. Trust and the amenability to borrow digital platforms constantly crop through peer influence and social relations. Using community leaders, original influencers, or village-predicated women's groups can produce familiarity and reduce hesitancy toward digital financial tools. Programs anchored in community engagement can meliorate credibility and handover. Digital fiscal addition in Pakistan represents a complex, multidimensional issue shaped by gender inequalities, structural vulnerabilities, situations of institutional trust, and behavioral considerations. This study emphasizes the need for integrated, gender-responsive, and terrain-specific strategies to ensure that digital financial systems promote indifferent participation rather than buttressing being inequalities. Addressing gaps in fiscal knowledge, buttressing institutional trust, enhancing access, and enforcing gender- inclusive strategies can enable Pakistan to progress toward a further inclusive and sustainable digital fiscal ecosystem.

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