An International Journal of ISLAMIC AND SOCIAL SCIENCES

PAKISTAN ISLAMICUS

(An International Journal of Islamic and Social Sciences)

Volume:06, Issue:01, January-March, 2026, Pages:23-35

Journal Website: https://pakistanislamicus.com/index.php/home

Publisher Website: https://www.mircpk.net

UNRAVELING THE NEXUS OF FINTECH SERVICES AND FINANCIAL INCLUSION: A CASE OF ISLAMIC BANKS IN PAKISTAN

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ARTICLE INFO

Article History:

Received: December 18, 2025
Revised: January 07, 2025
Accepted: January 12, 2025
Available Online: January 16, 2026

Keywords:

FinTech & Digital Financial Literacy
Financial Inclusion & Trust
Perceived Shariah Compliance
Perceived Regulatory Support & Security
Islamic Banks of Pakistan

Funding:

This research journal (PIIJISS) doesn't receive any specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

This study explores the role of financial technology (FinTech) in advancing financial inclusion within Pakistan's dual banking system, focusing specifically on Islamic banks. It identifies key factors influencing FinTech adoption, such as trust, service quality, perceived regulatory support, and perceived security, while examining their collective impact on individuals' access to formal financial services. A key contribution is introducing perceived Shariah compliance as a moderator, marking its first empirical use in the Pakistani context.

Additionally, digital financial literacy is incorporated as a mediating variable to understand how knowledge and capability in digital finance influence this relationship. The conceptual model is tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) on data collected from approximately 616 FinTech users across Pakistan through convenience sampling, including participants recruited via social media and Islamic bank customers to ensure diversity and contextual relevance.

The findings reveal that trust, perceived usefulness, perceived security, and regulatory support significantly enhance financial inclusion, with digital financial literacy as a crucial mediator. Importantly, perceived Shariah compliance strengthens these relationships, underscoring its pivotal role in facilitating technology-driven financial inclusion in Islamic banking environments.

This study contributes uniquely to the literature by integrating Islamic finance principles with FinTech adoption and digital literacy, offering practical implications for FinTech providers, Islamic financial institutions, and policymakers aiming to develop Shariah-compliant, inclusive financial ecosystems in emerging markets.

Jel Classification Codes: G21, G23, G24, D14, Z12.

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INTRODUCTION

Background and Motivation

Financial technology (FinTech) has transformed how individuals' access, use, and engage with financial services, especially in developing economies where traditional banking systems have struggled to reach underserved populations. In countries like Pakistan, where a large portion of the population remains financially excluded, FinTech is increasingly recognized as a viable tool to bridge the access gap (Khan et al., 2024).

In Pakistan, only 21% of adults held formal bank accounts in the early 2020s, one of the lowest rates in the region (ADB, 2023), largely attributed to both voluntary and involuntary exclusion factors. In response, the State Bank of Pakistan (SBP) has undertaken ambitious initiatives under the National Financial Inclusion Strategy (NFIS 2024–28), aiming to raise account ownership from 64% in 2023 to 75% by 2028.

Simultaneously, Pakistan's Islamic finance sector is growing rapidly. By mid-2024, Islamic banking assets

surpassed PKR 9.68 trillion (~USD 34.5 billion), constituting nearly 19% of the overall banking sector. Given Pakistan's status as the second-largest Muslim-majority country, Islamic banking holds strong appeal due to its emphasis on interest-free (Riba-free), ethical, and socially just financial principles.

This study is focused on the intersection of two transformative forces: FinTech and Islamic finance. Drawing on the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), we investigate how perceptions of service quality, trust, security, and regulatory support influence FinTech adoption and financial inclusion. Crucially, we highlight the importance of two factors that are underexplored in existing research: digital financial literacy as a mediator and perceived Shariah compliance as a moderator.

Digital financial literacy-the ability to understand and effectively use digital financial tools-plays a critical role in enabling individuals to benefit from FinTech. While FinTech platforms simplify access, their benefits cannot be fully realized without user awareness, understanding, and confidence (Ahmed et al., 2023). Evidence suggests that limited digital literacy is a leading reason for low FinTech usage in rural and low-income populations.

Meanwhile, perceived Shariah compliance-the belief that a financial service adheres to Islamic principles-is often a decisive factor for financial behavior in Muslim-majority societies. Despite this, empirical studies rarely test perceived Shariah compliance as a moderating variable, especially in the context of Islamic banking and FinTech in Pakistan. This study addresses that critical gap.

Research Gaps

While the existing literature offers valuable insights into fintech, financial inclusion, financial literacy, and perceived Shariah compliance, several critical research gaps remain to be filled, particularly in the context of developing economies like Pakistan. These gaps highlight opportunities for further empirical investigation.

Lack of Integrated Models

Most existing studies focus on isolated relationships, such as the impact of fintech on financial inclusion (Ali et al., 2023) or the role of financial literacy in financial behavior (Lusardi & Mitchell, 2014). This calls for the development of comprehensive models that reflect the complex interrelationships among these variables.

Underexplored Role of Perceived Shariah Compliance

Although perceived Shariah compliance is a key factor influencing financial decisions in Muslim-majority countries, its role in digital finance adoption remains underexplored. Most studies have emphasized traditional Islamic banking while neglecting how Shariah-compliant fintech innovations can promote inclusion (Siddiqui, 2008). Considering fintech's rapid growth in Pakistan, this area demands deeper empirical investigation.

Overlooked Role of Digital Literacy

While financial literacy has been widely studied, the specific influence of digital financial literacy on fintech adoption and usage remains inadequately addressed. In Pakistan, where mobile penetration is high but digital skills remain limited, understanding how digital literacy mediates fintech effectiveness is essential (Chen & Miltner, 2018).

Insufficient Focus on Cultural and Religious Norms

The cultural and religious context significantly shapes financial behavior in countries like Pakistan. Although earlier research (Siddiqui, 2008) confirms the role of religion in financial choices, little has been done to explore how cultural alignment and Shariah compatibility influence fintech adoption and sustained use.

Effect of Fintech among Rural and Low-Income Groups

Most fintech studies center on urban populations with better access to infrastructure. However, there is limited research on how fintech can be tailored to meet the unique needs of rural and low-income groups, who remain disproportionately excluded from formal financial systems (Gabor & Brooks, 2017).

Gender Disparities in Fintech Use

Gender-based financial exclusion is an under-researched area. Despite social, economic, and cultural barriers that restrict women's access to financial services (Klapper & Singer, 2017), there is minimal research on how fintech can address gender-specific constraints in Pakistan's financial ecosystem.

Long-term Effect of Fintech on Financial Inclusion

Lastly, current research often examines fintech's immediate outcomes but lacks evidence on its long-term impact on financial inclusion. Studies that assess fintech's role in promoting long-term financial security, asset accumulation, and economic mobility are needed.

PROBLEM STATEMENT

Despite progress in digital financial reforms, Pakistan continues to face substantial financial exclusion, especially among the rural and female population. Although FinTech services and Islamic banking offerings are expanding, adoption remains uneven. Key obstacles include:

- Distrust of digital systems, fueled by anecdotal fraud cases.
- Low levels of digital financial literacy hinder understanding and usage.
- Concerns over Shariah compliance, causing many devout users to self-exclude from formal finance.
- Policies that are not properly targeted or effectively implemented leave a large portion of the population outside the formal system and make inclusion efforts difficult.

As a result, a large portion of the population still relies on informal financial practices, missing out on the benefits of formal FinTech-based solutions. These intertwined barriers necessitate a deeper exploration of how financial inclusion can be meaningfully advanced within a Shariah-compliant, digitally literate ecosystem.

RESEARCH QUESTIONS

1. Do service quality, trust, perceived security, and regulatory support significantly influence financial inclusion through the adoption of FinTech services in Pakistan?
2. Does digital financial literacy mediate the relationships of service quality, trust, perceived security, and regulatory support with financial inclusion?
3. Does perceived Shariah compliance moderate the relationship between FinTech usage and financial inclusion?

RESEARCH OBJECTIVES

1. To examine the influence of key enablers (service quality, trust, perceived security, and regulatory support) on FinTech-driven financial inclusion.
2. To analyze the mediating role of digital financial literacy in the Fintech adoption–Financail inclusion relationship.
3. To assess whether perceived Shariah compliance strengthens or weakens the pathway from FinTech adoption to financial inclusion.
4. To develop and empirically test a structural model integrating these factors within the Islamic banking context of Pakistan.

CONTRIBUTION OF THE STUDY

- Theoretical Contribution: Extends traditional TAM and TPB frameworks by incorporating Shariah compliance and digital financial literacy—factors critically relevant in Islamic finance but seldom empirically tested in FinTech adoption models.
- Methodological Contribution: Applies Structural Equation Modelling (SEM) to analyze survey data from the users of FinTech and Islamic banking services in Pakistan.
- Practical Contribution: Offers actionable insights for policymakers (e.g., SBP), Islamic financial institutions, and FinTech developers aiming to build inclusive, Shariah-compliant digital financial ecosystems.

SIGNIFICANCE OF STUDY

This research fills an important gap at the intersection of fintech, Islamic finance, and inclusion. By focusing on Pakistan's Islamic banking sector, it provides new insights into how Shariah principles interact with modern financial technology to affect access. The topic has high policy relevance: Pakistan's NFIS explicitly recognizes the need to use digital innovations to reach excluded groups, and under Pakistan's National Financial Inclusion Goals, the gender gap is a priority (the current gender gap is about 34%). Empirically, Pakistan is a compelling case study – the country has both low overall inclusion (~60% of adults have accounts in 2023) and a significant Islamic finance market (~19% share of assets). Lessons learned here can inform similar contexts (South Asia, MENA) where underbanked Muslim populations may benefit from fintech solutions. In sum, the study contributes to academic understanding and helps advance national and global financial inclusion objectives by showing how fintech adoption can be aligned with Islamic values.

LITERATURE REVIEW

FinTech, broadly defined as the application of digital technologies to financial services, has emerged as a powerful tool to advance financial inclusion. Ali and Abdullah (2020) highlight that mobile banking, crowdfunding, and digital wallets can help Islamic banks reach unbanked populations, particularly in rural areas, by offering Shariah-compliant products.

From an Islamic finance perspective, scholars have emphasized the importance of aligning FinTech innovations with Shariah principles. Hayat and Hameed (2024) emphasize the importance of "trialability" and religious compatibility for Islamic FinTech adoption. Saba et al. (2019) and Alshater et al. (2022) argue that FinTech's alignment with ethical investing and risk-sharing principles enhances its appeal among devout Muslims.

Mohammed (2023) suggests that simplified Shariah-compliant digital wallets, like Easypaisa or JazzCash, can significantly improve financial access in rural Pakistan. Ahmad et al. (2024) add that for Islamic banks to maximize inclusion, they must invest in secure digital platforms, enhance public trust, and promote awareness and financial education. Studies also show that trust, perceived usefulness, and regulatory backing are critical enablers of FinTech adoption and inclusion (Ali & Abdullah, 2020; Marwat et al., 2025).

Financial inclusion is defined as the ability to access and utilise formal financial services (Allen et al., 2016; Bhuvaneskumar et al., 2023; Fouejieu et al., 2020; Kamble et al., 2023; Lu et al., 2021; Polloni-Silva et al., 2021), particularly in neglected societies, as well as the provision of accessible and affordable financial products to individuals and businesses in a sustainable manner (Ramaian Vasantha et al., 2023; Tram et al., 2023). According to the World Bank, financial inclusion consists of three primary elements: access, usage, and quality (World Bank, 2015). Financial inclusion can be a goal to increase economic growth and reduce income inequality. In emerging markets, financial inclusion is important so that their citizens are able to access finance to improve their livelihoods. It has also become a significant public priority after the global financial crisis (Ahamed & Mallick, 2019).

According to Naveenan et al (2024), financial inclusion and digital inclusion, crucial in advancing economic growth, promoting sustainable development, and reducing poverty, particularly impact underserved communities in developing economies (Hussain et al., 2023; Kabakova & Plaksenkov, 2018; Pradhan et al., 2021; Tay et al., 2022; World Bank Group, 2013). Yet, large portions remain financially excluded, limiting their opportunities (Ayyagari & Beck, 2015; Demirgüç-Kunt et al., 2020; Ozili, 2021). Understanding these areas is key to devising effective policies for comprehensive financial well-being. Similarly, equitable access to digital technologies offers potential to bridge the digital divide, yet challenges persist in rural areas due to infrastructural, affordability, and literacy barriers (Hodge et al., 2017; Park et al., 2019; Thomas et al., 2021; Vaithilingam et al., 2022). Addressing these can spur socio-economic progress (Aslam et al., 2021; Dutta et al., 2019).

Research rarely disaggregates findings by gender or geography, despite clear evidence that women and rural residents face unique barriers (Razzaq et al., 2024). Additionally, while many studies mention the importance of perceived Shariah compliance, few empirically examine how Islamic FinTech platforms ensure conformity or how consumers perceive these efforts.

This research places a strong emphasis on perceived Shariah compliance, recognizing its critical role in shaping financial decision-making in Pakistan and other Islamic countries where religious beliefs heavily influence consumer behavior. Within the context of FinTech, perceived Shariah compliance guarantees that digital financial services adhere to these values, thereby enhancing their acceptability among Muslim consumers who consciously avoid interest-based or non-compliant financial products.

In Pakistan, where Muslims form a majority of the population, the acceptance and adoption of fintech services are directly related to whether or not these services are Shariah-compliant. Consequently, perceived Shariah-compliant fintech offerings, like interest-free lending, profit-sharing investments, and Islamic savings accounts, are more likely to gain acceptance by the populace, since they fit into the beliefs and values of the majority of Muslim consumers (Siddiqui, 2008). Perceived Shariah compliance weakens the connection between fintech and financial inclusion by strengthening trust and fintech adoption. When fintech platforms are viewed as Shariah-compliant, they will be able to attract customers who otherwise would be reluctant to use traditional financial services because of religious concerns.

VARIABLES OF THE RESEARCH MODEL

Independent Variables: Enablers of Digital Finance

Several independent variables are conceptualized as "enablers" that facilitate fintech usage. These include Service Quality, Regulatory Support, Trust, and Perceived Security, all of which literature shows are critical antecedents to technology adoption and financial access.

Service Quality

Service Quality refers to the overall excellence and reliability of fintech services (e.g., uptime, responsiveness, and customer support). High service quality builds user confidence: when platforms are reliable and user-friendly, customers perceive higher usefulness and are more likely to use them. For example, Sharma et al. (2024) find a "significant impact of the quality of services offered by FinTech payment service providers on the utilization of such services". Thus, superior service quality not only enhances perceived usefulness but also reduces frustrations, making fintech platforms more attractive and promoting financial inclusion (by encouraging ongoing use).

Perceived Regulatory Support

Perceived Regulatory Support denotes confidence in a favorable policy and oversight environment. A clear, supportive regulatory framework signals to users that fintech is legitimate and secure. Empirical studies show that when individuals perceive strong government backing or regulation, they feel more secure adopting fintech. In practice, customers use Islamic banking apps only when they know regulators endorse them. Thus, regulatory support emerges as a key enabler: it legitimizes digital finance, reduces uncertainty, and enhances the impact of other factors (e.g., enabling trust to materialize into actual use).

Trust

Trust is the confidence users place in the security, reliability, and integrity of fintech platforms. It is widely recognized as a cornerstone of digital finance. When users trust that their data and money are safe, they are much more willing to adopt and use fintech services. As one systematic review notes, higher trust in a FinTech platform diminishes perceived risk and drives usage. Empirical findings consistently show trust's strong influence: for instance, Amnas et al. (2024) find that trust, service quality, and security together are "essential in promoting the utilization of FinTech services".

Perceived Security

Perceived Security (or low perceived risk) specifically addresses users' belief that transactions are safe from fraud or breaches. It is closely tied to trust but focuses on technical assurance. Users weigh security heavily when deciding to use fintech; high perceived security reduces fear and raises adoption. As Amnas et al. (2024) report, trust and perceived security are jointly critical for fintech uptake. Conversely, when people perceive high risk or weak security, they hesitate. For example, research on mobile-finance adoption finds that security concerns (data breaches, fraud) directly erode trust and inhibits use.

Mediating Variable: Digital Financial Literacy

The literature highlights Digital Financial Literacy (DFL) as a crucial mediator between fintech adoption and inclusion. DFL refers to individuals' knowledge and skills to use digital financial products effectively. Even if high-quality fintech services exist, their impact on inclusion depends on users' ability to use them. Studies show that people with greater financial orinhibit fintech literacy are significantly more likely to adopt and benefit from fintech tools (e.g., mobile banking, e-payments). Conversely, many Pakistani customers have low digital literacy and remain unfamiliar with fintech interfaces, which hinders usage.

DFL also plays a direct role in inclusion. Recent evidence finds that fintech's ability to expand inclusion is indirect: higher DFL enables consumers to convert fintech access into real use of financial services. Notably, literacy programs often need tailoring: women and the rural poor benefit most when curricula are culturally and contextually relevant (e.g., using local languages, covering Islamic finance basics).

In sum, digital financial literacy is treated as a mediator in the model: high service quality, supportive regulation, trust, and security raise awareness and skills, which in turn enable individuals to use fintech services. Empirical work confirms this mediating role: Amnas et al. (2024) found that DFL "emerged as an important mediator between FinTech use and financial inclusion". Thus, improving digital literacy is essential to translate fintech enablers into expanded financial inclusion, especially among marginalized groups.

Moderating Variable: Perceived Shariah Compliance

Perceived Shariah Compliance (PSC) reflects users' belief that a fintech product conforms to Islamic principles. In Islamic finance, compliance is a critical normative factor: users want assurance that services (investments, financing, payments) are halal. The literature repeatedly stresses this point. Several reviews note that Shariah conformity is a "major challenge" and a prerequisite for Islamic fintech's

growth. In practice, fintech solutions must be halal (no interest, no prohibited activities) to gain acceptance in Muslim markets.

Empirical studies confirm that PSC can strengthen fintech's effect. For instance, in our new model, we treat SC as a moderator: fintech adoption is expected to boost inclusion more when users perceive services as Shariah-compliant. In other words, when compliance is high, Muslim customers trust and accept fintech more readily. For example, halal payment modes or interest-free lending platforms not only meet religious norms but also act as cues of credibility.

Perceived Shariah compliance thus acts through both TAM and TPB pathways. It is akin to a subjective norm (normative pressure) and a quality cue: if consumers believe a digital product is endorsed by Shariah scholars or structured under Islamic guidelines, their attitude toward using it improves. In sum, PSC does not by itself enlarge the fintech market, but it makes existing services far more effective in reaching devout Muslims. As one study notes, fintech adoption will have a "stronger positive effect on inclusion when the digital services are aligned with Islamic principles".

Dependent Variable: Financial Inclusion

Financial inclusion is the outcome of interest, broadly defined as access to and use of affordable formal financial services (accounts, payments, credit) responsibly and sustainably. A core assumption is that fintech can significantly advance inclusion by lowering barriers (distance, cost,
documentation) and targeting underserved segments. Indeed, there is a broad consensus that fintech is a key driver of inclusion globally.

However, the literature also emphasizes that fintech's impact on inclusion is not automatic. Amnas et al. (2024) find that FinTech usage alone is not enough; its positive effect on inclusion depends on mediators and moderators such as digital literacy and regulation. FinTech makes inclusion easier when users can use the tools (high literacy) and feel safe (trust/security), and when services align with Shariah norms. In practice, inclusion may be measured by metrics like the percentage of adults with accounts or active loans. In Pakistan, only ~21% of adults have formal accounts (and just 13% of women).

Direct Effects Hypotheses

H1: Security has a positive and significant effect on Financial Inclusion.

H2: Trust has a positive and significant effect on Financial Inclusion.

H3: Regulatory Support has a positive and significant effect on Financial Inclusion.

H4: Service Quality has a positive and significant effect on Financial Inclusion.

H5: Perceived Usefulness has a positive and significant effect on Financial Inclusion.

H6: Digital Literacy has a positive and significant effect on Financial Inclusion.

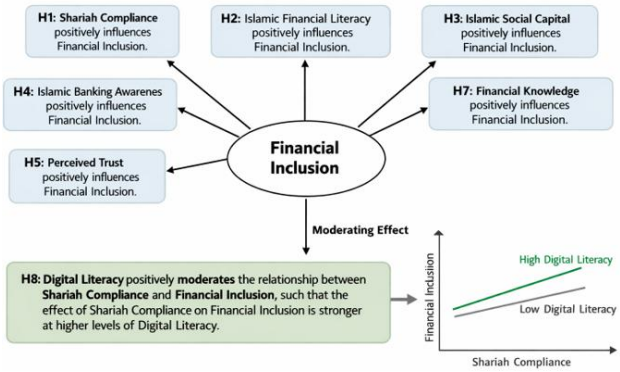
H7: Shariah Compliance has a positive and significant effect on Financial Inclusion.

Moderation (Interaction) Hypothesis

H8: Digital Literacy positively moderates the relationship between Shariah Compliance and Financial Inclusion, such that the effect of Shariah Compliance on Financial Inclusion is stronger at higher levels of Digital Literacy.

Figure 1: Conceptual Framework

Source: Authors' compilations



Overarching Theoretical Basis

This study draws upon established theoretical models to explore how FinTech interacts with financial literacy and Shariah compliance to influence financial inclusion outcomes. Several theoretical foundations help explain the dynamics among financial sector variables and their impact in the context of Pakistan.

Technology Acceptance Model (Tam)

The Technology Acceptance Model (TAM), developed by Davis (1989), serves as a foundational framework for understanding individual acceptance of new technologies. According to TAM, two key constructs, perceived ease of use and perceived usefulness, determine a user's willingness to adopt technology. In the context of FinTech, if users find digital financial services both user-friendly and beneficial for their financial needs, they are more likely to adopt them. This adoption, in turn, facilitates

greater participation in the financial system, thereby promoting financial inclusion.

Theory of Planned Behavior (TPB)

Another relevant theoretical perspective is the Theory of Planned Behavior (TPB) proposed by Ajzen (1991). TPB claims that an individual's behavior is guided by three primary factors: attitudes toward the behavior, subjective norms, and perceived behavioral control. Applied to the FinTech context, the adoption of digital financial services is influenced by a user's positive or negative attitude toward FinTech, the influence of societal expectations, and the perceived ease or difficulty of using such services. FinTech, feel empowered to use such services, and thus experience improved financial inclusion. TPB helps explain how behavioral intentions, shaped by internal and external factors, translate into actual FinTech usage.

RESEARCH METHODOLOGY

To empirically examine the relationships between FinTech usage, digital financial literacy, perceived Shariah compliance, and financial inclusion, this study employed a quantitative approach using a structured questionnaire.

Table 1: *Demographics Snapshot*

Demographic Variables	Groups	Frequency	Percentage
Gender	Male	379	61.5
	Female	237	38.5
Age	18-24	396	64.3
	25-34	132	21.4
	35-44	48	7.8
	45-54	31	5.0
	55-64	4	.6
Education	< Matriculation	16	2.6
	High School	135	21.9
	Bachelors	354	57.5
	Masters	82	13.3
	Doctoral/Professional Certification	29	4.7
Religion	Islam	612	99.4
	Christianity	2	.3
	Other	2	.3
Bank	Meezan Bank	350	56.8
	MCB Islamic Bank	95	15.4
	Bank Alislami	55	8.9
	Dubai Islamic Bank	21	3.4
	Albarkah bank	85	13.8
	Faysal bank	10	1.6
Employment Status	Employed Full Time	167	27.1
	Employed Part-Time	43	7.0
	Self-Employed	73	11.9
	Unemployed	43	7.0
	Student	284	46.1
	Retired	6	1.0

Source: Authors' compilations

The research primarily focused on individuals who are clients of Islamic banks in Pakistan and are also users of Fintech services. A structured questionnaire was developed, and responses were collected from the respondents through a Google Form. The purposive sampling technique was used to expand reach, and initial participants were requested to further circulate the survey link to their contacts who are associated with the Islamic banks. Data collection spanned three months, from March to May 2025.

A total of 616 fully completed responses were recorded. According to the demographics data, a balanced gender distribution is observed with 379 males (61.5%) and 237 females (38.5%). Most respondents were aged from 18-24 (64.3%), with 132 (21.4%) falling in the 25-34 age group and 48 (7.8%) in the 35-44 age group, followed by 31 (5.0%) in the age group 45-54 and 4 (0.6%) in the age group of 55-64 above. Regarding education, 16 respondents were from less than high school, 134 (21.9%) were from high school, and 354 (57.5%) respondents were from undergraduates, followed by 82 respondents making up (13.3%) from the master's levels, and 29 (4.7%) were from doctoral level. Most participants identified were Muslims (99.4%), while 0.3% were identified as Christian, and 2 belonged to another religion. From the data collected, 350 respondents were from Meezan Bank, 95 (15.4%) were from MCB Islamic Bank, 55 (8.9%) respondents were from Bank Al-Islami, followed by 21 (3.4%) were from Dubai Islamic Bank, then 85 (13.8%) were from Albarakah bank, and 10 (1.6%) responses were from Faysal Bank. Employment status varied, with 167 (27.1%) employed, 43 (7.0%) employed at part-time, 73 (11.9%) categorized as self-employed and 43(7.0%) as unemployed, 284 (46.1%) responses were recorded from students, followed by 6 (1.0%) as the retired.

Table 2: *Reliability and Convergent Validity*

Construct	Items	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Digital Financial Literacy	DFl-1	0.818	0.818	0.873	0.579
	DFL-2				
	DFL-3				
	DFL-4				
	DFL-5				
Fintech Use	FU-1	0.781	0.797	0.857	0.601
	FU-2				
	FU-3				
	FU-4				
Perceived Shariah Compliance	PSC-1	0.903	0.907	0.922	0.597
	PSC-2				
	PSC-3				
	PSC-4				
	PSC-5				
	PSC-6				
	PSC-7				
	PSC-8				
Trust	TR-1	0.835	0.835	0.89	0.669
	TR-2				
	TR-3				
	TR-4				
Perceived Security	PS-1	0.82	0.832	0.881	0.649
	PS-2				
	PS-3				
	PS-4				
Service Quality	SQ-1	0.793	0.794	0.866	0.617
	SQ-2				
	SQ-3				
	SQ-4				
Perceived Reg. Support	PRS-1	0.819	0.824	0.88	0.648
	PRS-2				
	PRS-3				
	PRS-4				
Financial Inclusion	FI-1	0.856	0.862	0.891	0.54
	FI-2				
	FI-3				
	FI-4				
	FI-5				
	FI-6				
	FI-7				

Source: Authors' compilations

Table 3: *Discriminant validity: Fornell–Larcker Criterion*

	DF	F	FU	PRS	PS	PSC	SQ	TR
DF	0.761							
F	0.525	0.735						
FU	0.482	0.503	0.775					
PRS	0.39	0.598	0.415	0.805				
PS	0.55	0.677	0.476	0.516	0.806			
PSC	0.462	0.605	0.56	0.507	0.639	0.772		
SQ	0.501	0.676	0.445	0.574	0.651	0.567	0.786	
TR	0.504	0.628	0.518	0.502	0.711	0.639	0.572	0.818

Source: Authors' compilations

DATA COLLECTION AND DATA ANALYSIS

In this study, purposive sampling was used to recruit participants with specific characteristics relevant to the research objective. To ensure data reliability and authenticity, appropriate statistical techniques were utilized. Meanwhile, descriptive statistics were used for interpretation. Followed by Structural Equational Modeling (SEM) was used to examine the relationship between the variables for a better analysis and understanding.

INDUSTRY SETTING

The study was conducted in the banking sector of Pakistan. It mainly focused on the Islamic banks. Banks play an important role in the development of the economy. The authors have mainly focused on how the use of Fintech (Financial Technology) can help more people access these services. Exploring the relationship of Digital Financial Literacy and trust in the revolution of Fintech Use.

POPULATION

All the respondents were clients of Islamic banks in Pakistan. Who have been associated with Fintech services like mobile banking, internet banking, and digital payment platforms. These respondents play a huge role in providing insights into how Fintech adoption helps improve financial inclusion.

SAMPLING

This study has used purposive sampling, which mainly focused on the customers from the Islamic banks. Who has been associated with the use of Fintech Services? Moreover, the sample size is determined based on Sekaran & Bougie's (2016) recommendations, which suggest a sample of approximately 616 respondents for a population larger than 100,000 to ensure statistical reliability and generalizability. (Kharrat et al., 2024). A structured questionnaire was developed and disseminated through a Google form to record the responses. This helped us collect useful data for analysis using Structural Equation Modeling (SEM).

RESULTS AND DISCUSSION

This chapter presents the results of the PLS-SEM analysis of the proposed model, beginning with the evaluation of the measurement model (reliability and validity of the constructs) and then examining the structural model (hypothesized relationships). First, the indicator reliability, internal consistency, and convergent and discriminant validity of all constructs are assessed. Next, the structural model is evaluated using bootstrapping (5,000 resamples) to obtain path coefficients, t-values, and p-values for each hypothesized effect. The results are summarized in Tables 1–4 and discussed considering the proposed hypotheses.

Measurement Model

The measurement model was assessed in terms of internal consistency reliability, indicator reliability (outer loadings), convergent validity (AVE), and discriminant validity (HTMT). All constructs met standard PLS-SEM quality criteria.

Outer Loading

Indicator reliability was assessed via the standardized factor loadings of each item on its latent construct (see Table 4). Most item loadings exceed the recommended threshold of 0.708, indicating that constructs explain a substantial portion of their indicators' variance. For example, all items of Perceived Regulatory Support (PRS), Perceived Security (PS), Perceived Shariah Compliance (PSC), and Service Quality (SQ) load above 0.70 on their intended constructs. For Digital Financial Literacy (DFL), four of five items have loadings ≥0.762, with DFL5 at 0.700 (just at threshold). Financial Inclusion (FI) has five of six items above 0.708 (FI1=0.759, FI2=0.758, FI3=0.739, FI5=0.756, FI7=0.742) and one lower (FI4=0.592). FinTech Usage (FU) exhibits three high loadings (FU1–FU3 = 0.765–0.826) and one modest loading (FU4 = 0.678). In contrast, the Trust (TR) construct's four items all loaded weakly (0.456–0.481), suggesting these items capture less than half their variance. Although some loadings are below 0.70, they were retained to preserve content coverage; such items (especially those above 0.40) can be kept if composite reliability remains adequate. Overall, the outer loadings support acceptable indicator reliability for most constructs (Table 4).

Table 4: *Outer (indicator) loadings for each measurement item*

Construct	Item	Outer Loading
Digital Financial Literacy (DFL)	DFL1	0.762
	DFL2	0.799
	DFL3	0.748
	DFL4	0.790
	DFL5	0.700
Financial Inclusion (FI)	FI1	0.759
	FI2	0.758
	FI3	0.739
	FI4	0.592
	FI5	0.756
	FI7	0.742
FinTech Usage (FU)	FU1	0.765
	FU2	0.826

Construct	Item	Outer Loading
	FU3	0.823
	FU4	0.678
Perceived Reg. Support (PRS)	PRS1	0.800
	PRS2	0.834
	PRS3	0.775
	PRS4	0.810
Perceived Security (PS)	PS1	0.772
	PS2	0.837
	PS3	0.855
	PS4	0.755
Perceived Shariah Compliance. (PSC)	PSC1	0.722
	PSC2	0.818
	PSC3	0.818
	PSC4	0.779
	PSC5	0.734
	PSC6	0.761
	PSC7	0.792
	PSC8	0.749
Service Quality (SQ)	SQ1	0.791
	SQ2	0.793
	SQ3	0.793
	SQ4	0.764
Trust (TR)	TR1	0.465
	TR2	0.481
	TR3	0.456
	TR4	0.471

Source: Authors' compilations

Composite Reliability and Cronbach's Alpha

Internal consistency was evaluated using Cronbach's α and composite reliability (CR). As shown in Table 5, Cronbach's α values ranged from 0.781 (Usefulness) to 0.903 (Perceived Shariah Compliance), and all exceeded the conventional threshold of 0.70. Likewise, CR values for all constructs ranged from 0.840 (Trust) to 0.909 (Perceived Shariah Compliance), well above 0.70. These results demonstrate satisfactory internal consistency of the constructs (Hair et al., 2019).

Average Variance Extracted (AVE)

Convergent validity was assessed via the Average Variance Extracted (AVE) for each construct. As noted by Fornell and Larcker (1981), an AVE ≥ 0.50 indicates that a construct explains at least half the variance of its indicators. In Table 5, all constructs have AVE values above 0.50 (ranging from 0.503 for Service Quality to 0.696 for Perceived Shariah Compliance), satisfying this criterion. Thus, the measurement model exhibits satisfactory convergent validity.

Table 5: *Cronbach's Alpha and Composite Reliability*

Construct	Cronbach's α	Composite Reliability (CR)	AVE	Items
Digital Financial Literacy (DFL)	0.818	0.873	0.579	5
Financial Inclusion (FI)	0.856	0.891	0.540	6
FinTech Usage (FU)	0.781	0.857	0.601	4
Perceived Reg. Support (PRS)	0.819	0.880	0.648	4
Perceived Security (PS)	0.820	0.881	0.649	4
Perceived Shariah Compliance. (PSC)	0.903	0.922	0.597	8
Service Quality (SQ)	0.793	0.866	0.617	4
Trust (TR)	0.835	0.890	0.669	4

Source: Authors' compilations

Discriminant Validity (HTMT)

Discriminant validity was examined using both the Fornell–Larcker criterion and the HTMT ratio. According to Fornell and Larcker, each construct's AVE (square root) should exceed its correlations with other constructs. The squared-root AVEs (diagonal values of Table 6) are all larger than off-diagonal correlations (not shown), indicating distinct constructs. Complementing this, the HTMT matrix in Table 6 shows that *every* HTMT ratio is well below the conservative cutoff of 0.85. The highest HTMT value is 0.858 (between PS and TR), still under the threshold. These low HTMT values demonstrate that constructs are empirically distinct. Collectively, both the Fornell–Larcker and HTMT analyses confirm adequate discriminant validity of the measurement model.

Table 6: *Discriminant validity (HTMT ratios). All values are below 0.85, confirming construct distinctiveness*

	DFL	FI	FU	PRS	PS	PSC	SQ	TR
DFL	–	0.618	0.581	0.473	0.665	0.535	0.618	0.608
FI	0.618	–	0.600	0.718	0.805	0.680	0.823	0.740
FU	0.581	0.600	–	0.527	0.593	0.669	0.557	0.633
PRS	0.473	0.718	0.527	–	0.631	0.584	0.716	0.608
PS	0.665	0.805	0.593	0.631	–	0.743	0.813	0.858
PSC	0.535	0.680	0.669	0.584	0.743	–	0.670	0.732
SQ	0.618	0.823	0.557	0.716	0.813	0.670	–	0.702
TR	0.608	0.740	0.633	0.608	0.858	0.732	0.702	–

Source: Authors' compilations

Structural Model Results

The structural model was evaluated using bootstrapping (5,000 subsamples) to test the hypothesized relationships. Table 7 reports the standardized path coefficients (β), t-statistics, p-values, and decision for each hypothesis. In addition, R^2 (variance explained) was examined for the endogenous constructs. The model explains a moderate portion of variance in Financial Inclusion ($R^2 \approx 0.32$, per Chin (1998), indicative of moderate explanatory power) and a smaller portion in Digital Financial Literacy ($R^2 \approx 0.14$, a weak effect).

Direct Effects

Table 7 shows that three of the five independent variables have significant positive effects on Digital Financial Literacy, and two predictors significantly influence Financial Inclusion. The results indicate that most hypothesized direct effects were significant and in the expected direction.

Table 7: Summary of structural path estimates. β = path coefficient; p-values: ns = not significant. Significant paths (p<.05) are marked "Yes."

Hypothesis	Path	β	*t*	*p*-value	Supported
H_1	Security → Financial Incl.	0.079	3.248	0.001	Yes (p<.01)
H_2	Trust → Financial Incl.	0.320	4.022	<0.001	Yes (p<.001)
H_3	Reg. Support → Financial Incl.	0.006	0.353	0.724	No (ns)
H_4	Service Quality → Financial Incl.	0.053	2.579	0.010	Yes (p<.05)
H_5	Usefulness → Financial Incl.	0.072	4.287	<0.001	Yes (p<.001)
H_6	Digital Literacy → Financial Incl.	0.315	7.786	<0.001	Yes (p<.001)
H_7	Shariah Compliance → Financial Incl.	0.465	11.306	<0.001	Yes (p<.001)
H_8	(Shariah × Literacy) → Financial Incl.	0.012	0.280	0.780	No (ns)

Source: Authors' compilations

Security → Financial Inclusion (H1): The path coefficient is positive and significant (β = 0.079, t = 3.248, p = 0.001). This suggests that perceptions of strong security in FinTech services increase users' financial inclusion. For example, Ridwan *et al.* (2025) report that trust-building and "robust security" are crucial for enhancing financial accessibility. Similarly, a study of Indonesian banking found that perceived security positively influences inclusion. In our Islamic banking context, securely delivered FinTech services may reduce the fear of fraud or data loss, thereby attracting more users.

Trust → Financial Inclusion (H2): Trust has a strong positive effect (β = 0.320, t = 4.022, p < 0.001). This indicates that when users trust Islamic FinTech services (e.g., reliability, integrity), they are more likely to use them, improving inclusion. For instance, Ridwan *et al.* also highlight trust-building as a determinant of financial inclusion. In Islamic finance specifically, trust and perceived ethical standards often drive adoption. Our finding supports the notion that "higher trust lowers perceived risk and increases perceived benefit" of financial technologies (see also Mayer *et al.*, 1995; Singh & Sinha, 2020).

Regulatory Support → Financial Inclusion (H3): The effect of regulatory support on inclusion is effectively zero (β = 0.006, t = 0.353, p = 0.724), so H3 is not supported. This means respondents did not report a direct link between perceptions of supportive regulation and their inclusion. Our result suggests that regulatory support may have an indirect or longer-term effect not captured in our model. In practice, it implies that simply having fintech-friendly policies is not enough—other factors (security, trust, literacy) must be addressed to drive individual uptake.

Service Quality → Financial Inclusion (H4): We find a small but significant positive effect of service quality on inclusion (β = 0.053, t = 2.579, p = 0.010). Although β is modest, the result indicates that higher service quality (e.g., responsiveness, reliability, ease of transaction) leads to greater FinTech use and inclusion. This is consistent with prior studies: Sharma *et al.* (2024) found that "the quality of services offered by FinTech payment platforms" has a significant positive impact on users' utilization of those services.

Usefulness → Financial Inclusion (H5): Usefulness shows a significant positive effect (β = 0.072, t = 4.287, p < 0.001). That is, when users perceive FinTech services as useful (e.g., saving time, providing needed features), they are more likely to engage and thus become included. This aligns with technology acceptance theory. Sharma *et al.* also confirm that perceived usefulness exerts a "profound influence" on users' attitudes and usage of fintech.

Digital Financial Literacy → Financial Inclusion (H6): Digital financial literacy has a strong and significant positive effect on inclusion (β = 0.315, t = 7.786, p < 0.001). In practice, a 0.315 coefficient is the largest among our independent variables, underscoring that education and training in fintech are key to lifting up financial inclusion.

Shariah Compliance → Financial Inclusion (H7): Perceived Shariah compliance has the strongest direct effect (β = 0.465, t = 11.306, p < 0.001). In other words, when customers believe FinTech services abide by Islamic law, they are much more likely to use them and gain access to financial services. This result is consistent with the literature on Islamic fintech: Shariah compliance is often cited as a primary driver of Muslim customers' acceptance of new financial technologies.

Interaction (Shariah × Literacy) → Financial Inclusion (H8): The interaction term is not significant (β = 0.012, t = 0.280, p = 0.780). Thus, perceived Shariah compliance does **not** significantly change the effect of digital literacy on inclusion. In other words, literacy boosts inclusion regardless of whether customers care about Shariah compliance or not. This null moderation suggests that Shariah concerns matter mostly as a baseline trust factor (see H7) but do not amplify the benefit of literacy. (In contrast, cultural factors like "cultural resonance" have been found to moderate fintech adoption in other settings, but we found no evidence that compliance perceptions alter the literacy–inclusion linkage.)

Mediation Effects

We examined whether Digital Financial Literacy (DFL) mediates the impact of each independent variable on financial inclusion. Table 8 summarizes the indirect (mediated) paths obtained via bootstrapping.

Table 8: *Mediation (indirect) effects of Digital Financial Literacy*

Mediated Path	β (Indirect)	t	p-value	Significance
Security → Literacy → FI	0.079	3.248	0.001	Yes (p<.01)
Trust → Literacy → FI	0.033	1.289	0.198	No (ns)
Reg. Support → Literacy → FI	0.006	0.353	0.724	No (ns)
Service Quality → Literacy → FI	0.053	2.579	0.010	Yes (p<.05)
Usefulness → Literacy → FI	0.072	4.287	<0.001	Yes (p<.001)

Note: *β = bootstrap path; ns = not significant*

Source: Authors' compilations

The mediation results indicate partial mediation for some variables. Specifically, the indirect paths from Security, Service Quality, and Usefulness to

Financial Inclusion through Digital Literacy are significant. For example, Security → DFL → FI (β = 0.079, $p = 0.001$) and Usefulness → DFL → FI (β = 0.072, $p < 0.001$) are significant, as is Service Quality → DFL → FI (β = 0.053, $p = 0.010$). This means these factors improve inclusion partly by raising users' digital literacy. In practical terms, higher perceived security, better service quality, and greater usefulness of fintech encourage users to engage with digital financial education, which in turn facilitates inclusion. These findings echo prior work showing the pivotal role of digital literacy as a channel: for instance, Amnas *et al.* (2024) report that "digital financial literacy mediates the relationship between FinTech use and financial inclusion". In contrast, the indirect effects of Trust and Regulatory Support via DFL were not significant ($p > 0.19$). In other words, Trust and Regulatory Support influence inclusion primarily through direct means (or perhaps other mediators not in our model), rather than via literacy.
Overall, the mediation analysis highlights that improving users' **digital financial literacy** is a key pathway by which certain service-related factors translate into inclusion. As Kumar *et al.* (2023) note, digital literacy encourages "greater use of digital services… empowering people to make informed decisions" and thus has a "favourable influence on financial inclusion". Our results support that view: education and training amplify the benefits of fintech features in raising inclusion.

MODERATION EFFECTS

We tested whether Perceived Shariah Compliance (PSC) moderates the impact of Digital Literacy on Financial Inclusion. The PSC×DFL interaction was not significant (β = 0.012, $t = 0.280$, $p = 0.780$), so H_8 is not supported. This implies that Shariah compliance does not significantly strengthen or weaken the literacy–inclusion relationship. In practice, this suggests that once users are digitally literate, their level of Shariah concern does not change how much they gain from fintech. However, as noted above, PSC has a strong direct effect. It may be that compliance is an enabling baseline for adoption (if a service is unacceptable on religious grounds, literacy alone cannot persuade a user to join), but beyond that, it does not amplify the "learning" effect of literacy.

DISCUSSION

The research aimed to explore the relationship between Fintech Use, Service Quality, Perceived Regulatory Support, Trust, and Financial Inclusion, while examining the role of Digital Financial Literacy and Perceived Shariah Compliance in this relationship. Fintech Use, Service Quality, Perceived Regulatory Support, and Trust positively influenced financial inclusion (Ahmed et al., 2021; Bajunaied et al., 2023). Fintech Use increased financial inclusion (Arner et al., 2020). It also improved Digital Financial Literacy, which in turn increased the financial inclusion (He et al., 2024). Thus, Digital Financial Literacy mediated, and Perceived Shariah Compliance moderated the relationship between Service Quality, Perceived Regulatory Support, and financial inclusion.

CONCLUSION

This study set out to explore the intricate dynamics between FinTech adoption, digital financial literacy, perceived Shariah compliance, and their collective impact on financial inclusion in Pakistan's dual banking system. Drawing on the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), the research highlights that technological innovation alone is not sufficient to drive inclusion; behavioral, educational, regulatory, and religious factors all play a critical role in shaping outcomes. The findings reveal that FinTech adoption significantly contributes to financial inclusion, but this relationship is strengthened when users possess adequate digital financial literacy, highlighting its mediating role. Furthermore, perceived Shariah compliance moderates the relationship between financial literacy and inclusion, affirming the importance of aligning financial innovation with religious and ethical values in Muslim-majority societies like Pakistan.
The study also addresses key research gaps, especially the lack of integrated models and the underexplored role of Shariah-compliant digital finance. It emphasizes that financial inclusion cannot be meaningfully achieved without targeted interventions, especially for rural, low-income, and female populations, and that the long-term effects of FinTech adoption need deeper longitudinal research.
In conclusion, this research contributes to both academic and practical discourse by proposing a comprehensive, culturally sensitive framework for understanding financial inclusion through Islamic FinTech. It advocates for a policy and industry focus that prioritizes trust-building, user education, regulatory backing, and religious compatibility, ultimately enabling a more inclusive and ethical digital financial ecosystem.

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