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Islamic FinTech Innovation, Digital Service Quality, and the Adoption Intention of Islamic Digital Banking in Pakistan: The Mediating Role of Perceived Trust and the Moderating Effect of Financial Literacy

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Abstract

The present research explores the factors that affect the adoption of Islamic digital banking in Pakistan by analyzing how Islamic FinTech Innovation and Digital Service Quality influences the Adoption Intention of Islamic digital banking with the mediation of perceived trust and moderation of financial literacy. A three-wave time-lagged survey design was used to reduce common method bias and 387 Islamic banking customers from Karachi, Lahore, Islamabad and Peshawar were surveyed. The proposed framework was analyzed using partial least squares structural equation modeling (PLS-SEM) with the software of SmartPLS 4.0. The results indicate that the Islamic FinTech Innovation and Digital Service Quality had a significant influence on Perceived Trust, which, in turn, had a significant impact on Adoption Intention for Islamic digital banking services. The findings also support the important mediating effect of Perceived Trust and moderating effect of Financial Literacy on trust–adoption link. The study fills the gap of Islamic FinTech and digital banking literature by suggesting integrated moderated mediation framework in the backdrop of Islamic banks in Pakistan.

Keywords: *Islamic Fintech Innovation, Digital Service Quality, Perceived Trust, Financial Literacy, Adoption Intention, Islamic Digital Banking, Pakistan, PLS-SEM, Moderated Mediation*

Introduction

The nature of financial technology (FinTech) innovations has changed the design, delivery, and usage of financial services around the world (Gomber et al., 2018). Islamic digital banking has become a significant space of interest in countries dominated by the Muslim community where there is a significant overlap between religious compliance and digital convenience, as well as between religious compliance and financial inclusion. Although Pakistan is one of the most promising markets for Islamic financial technology, there remains a lack of research on the factors driving the adoption of Islamic digital banking in Pakistan (Islamic Financial Technology [IFT] [2023]; Raza et al., 2022). In the last decade, the Islamic banking industry in Pakistan has seen significant digitalization across various channels, including the emergence of Islamic mobile wallets, digital banking programs, and technological reforms (SBP, 2023; Mehmood et al., 2022). Even with these advances, the low level of trust, financial illiteracy, and worries about the quality and reliability of digital financial services (Akhtar et al., 2022; Usman et al., 2021) are hampering the adoption of Islamic digital banking services.

Trust has been identified as a key psychological determinant of the digital banking adoption behavior (Gefen et al., 2003; Liao et al., 2011). In the context of Islamic banking, trust also extends to the reliability of Islamic digital financial products and ethical integrity, as well as the Shariah compliance (Alam et al., 2021; Hassan et al., 2023). Moreover, the innovation and quality of Islamic FinTech services have a significant impact on customers' perceptions of Islamic digital banking platforms (Rabbani et al., 2021; Wilson, 2022; Parasuraman et al., 2005; Santos, 2003; Zeithaml et al., 2002). Financial literacy also has a significant impact on digital financial participation (Lusardi & Mitchell, 2014; Nicolini et al., 2013). Therefore, the present research suggests an integrated framework of moderated mediation that incorporates the theories of TAM, S-O-R framework and Trust Theory in order to investigate the adoption behavior of Islamic digital banking in Pakistan.

Theoretical Framework

This research is developed based on three theoretical backgrounds that complement each other: Stimulus-Organism-Response (S-O-R) theory, Technology Acceptance Model (TAM) theory, and Trust Theory. These frameworks are compounded and expanded into various themes to account for the unique religious, technological, and literacy-based aspect of digital banking adoption in Pakistan in the Islamic context.

Technology Acceptance Model (TAM)

According to the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh & Davis, 2000), the two most important factors influencing technology adoption behavior are perceived usefulness and perceived ease of use. TAM has been adopted extensively in the field of electronic banking (Alalwan et al., 2017), mobile banking (Martins et al., 2014), and FinTech adoption studies. Islamic FinTech innovation is defined as a factor that will affect the perceived usefulness and Shariah compliant value of Islamic digital banking, while the ease of use and system performance is captured by digital service quality. Conventional TAM, however, fails to adequately address the roles of trust and financial literacy and religious assurance in Islamic banking contexts. In this study, the Trust Theory and S-O-R are incorporated in TAM to help gain a better understanding of Islamic digital banking adoption behavior.

Stimulus-Organism-Response (S-O-R) Framework

S-O-R theory was first proposed by Mehrabian and Russell (1974) to explain how external stimuli in the environment affect the internal states of the organism (O) and consequently the organism's response (R) (Eroglu et al., 2001; Zhang et al., 2014). The S-O-R paradigm was used in the digital banking context to study the psychological responses to stimuli related to the platform, which were followed by an action such as satisfaction, loyalty and intention to use (Lo et al, 2022; Pappas et al, 2014). In this set up, the stimuli (S) are the external attributes and characteristics of the Islamic digital banking environment that the consumers are exposed to and which triggers the Islamic fintech innovation and digital services. Organism (O) represents the internal psychological condition that occurs in the presence of these stimuli, which is the condition of the existence of trust, the cognitive-affective reliability, security and integrity of Shariah. The response (R) is “adoption intention” which is decision to use or commit to use an Islamic digital banking platform. Perceived trust was tested as a mediating variable between environmental stimuli and behavioral outcomes, and the S-O-R mapping is a coherent theoretical framework that substantiates this mediation.

Trust Theory in Digital Islamic Banking

The dimensions of trust as suggested by McKnight et al. (2002) and later in online banking context by Gefen et al. (2003) are: competence-based trust (beliefs about the provider's technical/financial competence), benevolence-based trust (beliefs about the provider's interest in the user), and integrity-based trust (beliefs about the provider's honesty and ethical values). Islamic banking scholars have postulated the fourth dimension of Islamic banking, which is Sharia-compliance trust, representing trust in digital banking activities' adherence to Islamic jurisprudence (Al Shammre, 2025; Alam et al., 2021; Usman et al., 2021). Additionally, the present framework is informed by Luhmann's (1979) systemic theory on trust, which puts a special focus on the creation of trust in institutional systems of action, including regulatory supervision, certification bodies and sociotechnical systems, in addition to interpersonal trust. Institutional trust signals such as Pakistan's Shariah Governance Framework (2021) and Shariah regulatory approval of Islamic digital products can utilize consumers' experiential trust in service quality and innovation of FinTech. In the model currently used, the systemic or institutional components of trust are added to complement the theoretical conceptualization of perceived trust.

Financial Literacy as a Moderating Boundary Condition

Financial literacy is a construct that has emerged in financial product adoption literature as the awareness, knowledge, skills, attitudes, and behaviours required to make effective financial decisions (OECD, 2020). Perceived trust is a moderating variable in this study that helps explain the relationship between financial literacy and intention to use Islamic digital banking. Based on Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986), those with greater financial literacy are likely to process the information related to Islamic digital banking more systematically and critically, so that they can convert their trust into more effective behavior to adopt it. On the other hand, those with lower financial literacy can be trusted by the Islamic digital banking platforms, but they might not be able to bring their trust into cognitive commitment. This theorization is especially important in Pakistan, where the financial literacy of different demographic groups is relatively low, and unevenly distributed (SBP, 2022; World Bank, 2021).

Hypotheses Development

Islamic FinTech Innovation and Perceived Trust Islamic FinTech innovation includes the creation of halal payment platforms, blockchain-based zakat and waqf management, Islamic robo-advisory, and crowdfunding platforms (Rabbani et al., 2021; Wilson, 2022). Higher perceptions of Islamic FinTech innovations build customer trust as this reflects

innovation and technological skills in Islamic financial environments, which are required and acceptable in Islamic financial environments (Alam et al., 2021; Hassan et al., 2023). This is supported by prior research conducted in Malaysia, UAE and Indonesia which have revealed that FinTech innovativeness has a positive effect on trust in digital financial services (Hasan et al., 2020; Raza et al., 2022). Likewise, Mehmood et al. (2022) reported a significant enhancement of trust among Islamic banking consumers in Pakistan due to the awareness and acceptance of Islamic digital financial innovations.

H1: Islamic FinTech innovation has a significant positive effect on perceived trust among Islamic digital banking users in Pakistan.

Digital Service Quality and Perceived Trust

Digital service quality relates to the excellence of digital banking services, which include reliability, responsiveness, security, information accuracy, personalization and ease of use (Zeithaml et al., 2002; Parasuraman et al., 2005). The positive effects of digital service quality (DSQ) on customer satisfaction and trust in e-banking environments have been shown in previous research (Bauboniene & Guleviciute, 2015; Liao et al., 2011; Ribbink et al., 2004). Fast, reliable and secure digital services are an expression of institutional expertise and integrity, which build customer confidence (McKnight et al., 2002). Service quality is important in the context of Islamic digital banking for Pakistan as customers are more sensitive towards Shariah compliance, Profit and loss calculation accuracy, and security of religious financial information (Akhtar et al., 2022; Usman et al., 2021).

H2: Digital service quality has a significant positive effect on perceived trust among Islamic digital banking users in Pakistan.

Perceived Trust and Adoption Intention

Trust and behavioral intention is one of the most established relationships in adoption literature in the field of FinTech (Gefen et al., 2003; Kim et al., 2009; Schlosser et al., 2006). Trust lowers perceived risk, uncertainty, and therefore lowers the psychological barrier to the adoption of digital financial services. Islamic banking environments, however, rely on two types of trust: conventional risk-reduction mechanisms and religious assurance processes, where consumers have expectations that digital platforms can safeguard financial assets and ensure that they are Shariah-compliant and fulfill religious obligations (Alam et al., 2021; Hassan et al., 2023). The importance of trust is amplified in Pakistan because of its low level of financial inclusion and limited institutional trust (Zaman et al., 2017; SBP, 2023). One of the significant reasons for the low uptake of formal banking services by many Pakistani adults is lack of trust, according to World Bank (2021). Likewise, for Islamic digital banking platforms, the intention to adopt is greatly affected by trust deficits (Usman et al., 2021).

H3: Perceived trust has a significant positive effect on adoption intention of Islamic digital banking in Pakistan.

Mediating Role of Perceived Trust

In the context of the current research, perceived trust is defined as an in-between psychological state in the Stimulus-Organism-Response (S-O-R) model that is positioned between the external stimuli (Islamic FinTech innovation, digital service quality) and customers' intention to adopt Digital Services. This perception is in line with the previous literature in the field of e-commerce and mobile banking, which found trust as a fundamental cognitive and emotional process between the technology perceptions and the behavioral outcomes (Kim et al., 2009; Pappas et al., 2014; Zhou, 2012). Therefore, the effect of Islamic FinTech innovation and quality of digital service is not anticipated to directly trigger customers' adoption behavior, but it is expected to first build customers' trust in Islamic digital banking platforms, which in turn will influence adoption behavior.

However, the role of trust is significant in the context of Islamic banking because the customers' trust in the institution regarding various factors like reliability, Shariah compliance, halal authenticity and service dependability is a key consideration before using digital financial services (Alam et al., 2021; Hassan et al., 2023; Usman et al., 2021). The present study uses a three-wave time-lagged design, which provides a more valid evaluation of the mediation process because it provides temporal separation of the measurement of the stimulus, organism, and response variables.

Based on this, the following hypotheses are put forward:

H4a: Perceived trust mediates the positive relationship between Islamic FinTech innovation and adoption intention of Islamic digital banking in Pakistan.
H4b: Perceived trust mediates the positive relationship between digital service quality and adoption intention of Islamic digital banking in Pakistan.

Moderating Role of Financial Literacy

As discussed in Section 2.4, it is hypothesized that financial literacy will moderate the impact of perceived trust on adoption intention. Improving financial literacy provides consumers with the cognitive and evaluative abilities required to understand and respond to trust-based judgments of Islamic digital banking products (Grohmann, 2018; Lusardi & Mitchell, 2014). The level of trust in the Islamic financial platform by the financially literate consumer is expected to increase his/her tendency to use it, since his/her conceptual tools enable him/her to understand the mechanism of profit and loss sharing, digital security, and compare conventional and Islamic financial products.

On the other hand, a consumer with low financial literacy might have faith in the platform without the ability to link that confidence into confident adoption behavior. Theoretically, this interaction effect is supported by the elaboration likelihood model (ELM) developed by Petty & Cacioppo (1986); and empirically by the literature on financial behavior (Zaman et al., 2017; Grohmann, 2018). Financial literacy is expected to be extremely important in the Pakistani context as there is significant variation across the financial literacy levels of urban and rural population segments, gender groups and income brackets (World Bank, 2021). Accordingly:

H5: Financial literacy positively moderates the relationship between perceived trust and adoption intention, such that the positive effect of perceived trust on adoption intention is stronger among individuals with higher financial literacy.

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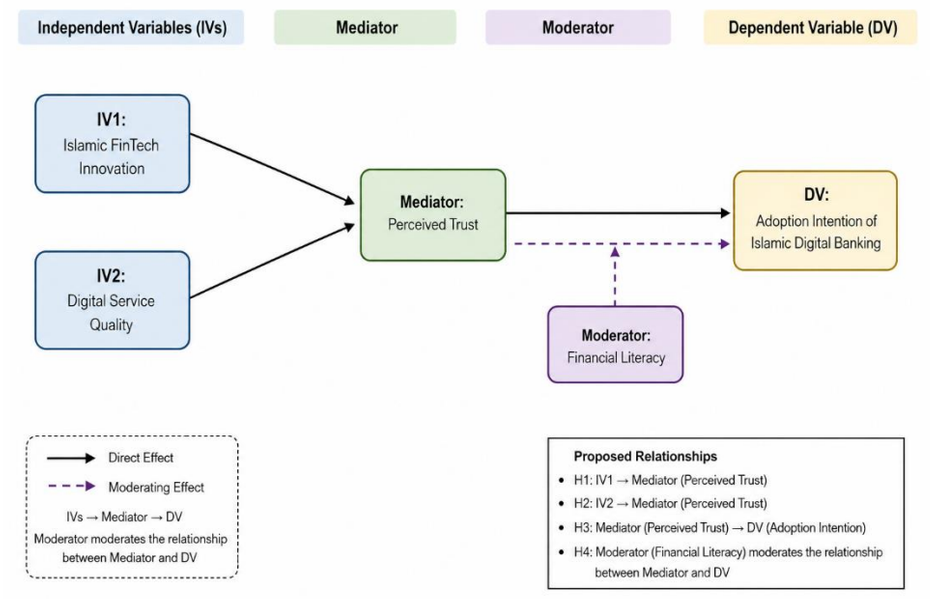

Figure 01: conceptual model

Methodology

Research Design: Three-Wave Time-Lagged Survey

Considering the common method bias (CMB) and the need for more robust causal inferences in line with the mediation and moderation hypotheses, the study is designed with a three-wave, time-lagged survey method (Podsakoff et al., 2003; Simmering et al., 2015). The interval between waveforms was four weeks, and this is an important methodological constraint for claiming mediation validity in non-experimental research (MacKinnon, 2008). By separating measurements in time, the chance that later answers are influenced by memory of previous answers (Chang et al., 2010) is also minimized. The three-wave design was used to measure independent variables (Islamic FinTech innovation, digital service quality, and demographic covariates) in Wave 1 (T1), the mediator variable (perceived trust) in Wave 2 (T2), and the dependent variable (adoption intention) and the moderating variable (financial literacy) in Wave 3 (T3), four and eight weeks after the first wave, respectively. This mapping is for the use of the predictor being measured before the mediator; and the mediator before the outcome, which is necessary for defensible mediation inference.

Population and Sampling

The target population included adult consumers (aged 18 and above) who had an open Islamic banking account and who used at least one Islamic digital banking service (mobile banking application, internet banking portal or Islamic bank's digital wallet) over the past six months leading up to the data collection period. This population definition guarantees that the respondents have firsthand experiential knowledge of Islamic digital banking products, thus improving content validity of self-reported perceptions. The method of accessing the target population in the study was purposive sampling which was further supplemented by snowball sampling. Data was collected in four major cities of Pakistan: Karachi, Lahore, Islamabad and Peshawar, which are the major Islamic banking hubs across the four provinces of the country. The initial number of respondents targeted in this study was 450, based on Hair et al.'s (2019) suggestions that PLS-SEM analyses with more than 5 latent variables with complex models require a minimum sample size of 200–400 for statistical power. Following data collection at three waves, 387 matched respondents (response retention rate = 86%) were retained for analysis, providing complete data at all three waves. Of this group, 54.8% were male, with an average age of 31.4 years, and 62.3% had a graduate or postgraduate degree.

Measurement Instruments

All the measurement scales were modified from the validated scales in the existing literature of Islamic banking adoption, FinTech adoption, digital service quality, and financial literacy. To ensure linguistic equivalence in the context of the Pakistani respondents, items were translated in Urdu and English using forward-backward translation technique (Brislin, 1970). The responses were coded on a seven-point likert scale (1 = Strongly Disagree; 7 = Strongly Agree) unless otherwise stated, following the recommendations of Hair et al. (2019) for ensuring sufficient response variation in PLS-SEM settings.

Islamic FinTech Innovation 6 Items

To measure Islamic FinTech innovation, the six items adopted from Rabbani et al. (2021) and Hasan et al. (2020) were used, which focused on perceptions of Shariah-compliant digital product innovation, novelty of halal digital payment features, advancement in Islamic investment technology, and introduction of AI-based Islamic advisory tools. Sample items are: ‘This Islamic bank continually launches new and innovative digital products that are Shariah-compliant' and ‘This bank's Islamic FinTech services are technologically sophisticated. In previous studies conducted in the GCC and South Asia context, the Rabbani et al. (2021) scale has been found to have good internal consistency (Cronbach's α = 0.87).

Digital Service Quality 7 items.

The digital service quality was measured with seven items stemming from E-S-QUAL instrument of Parasuraman et al. (2005) and taken from efficiency subscale, fulfillment subscale, system availability subscale, and privacy subscale with few items that are newly formed to the Islamic banking context from Akhtar et al. (2022). The instrument measures reliability of digital platform operations, accuracy of digital transaction processes, and security of online financial information and responsiveness of digital customer service. Samples of items include: ‘The Islamic bank's digital platform provides services on time and accurately' and ‘The Islamic bank's digital platform keeps my financial information secure'. The E-S-QUAL by Parasuraman et al. (2005) has been extensively tested in e-banking situations with Cronbach's α ranging from 0.88–0.93.

Perceived Trust (Mediator) — 6 Items
Perceived Trust, six items were adapted from McKnight et al. (2002) and Alam et al. (2021), which comprise of competence trust, benevolence trust and integrity trust and an additional item for Islamic banking context of perceived trust namely Shariah-compliance trust. The scale was validated and applied in the Islamic electronic banking studies of Pakistan, by Usman et al. (2021) with the Cronbach's α of 0.85–0.91, and Malaysia by Al Shammre (2025) and Faisal et al. (2023) with the Cronbach's α 0.85–0.91. These sample items are: 'I believe this Islamic digital bank is equipped to conduct digital banking service properly' and 'I trust that the digital banking service of this Islamic bank is a true digital banking service according to Islamic banking principles.

Financial Literacy (Moderator) — 5 Items
Financial literacy was measured through five items adapted from the OECD/INFE Financial Literacy Measurement Toolkit (OECD 2020) and Lusardi and Mitchell (2011) and two Islamic finance specific items developed by Butt and Khan (2019) for Pakistan. It includes knowledge of how to calculate profit in mudarabah, understanding of profit and loss sharing in musharakah, comparing products of Islamic banks with conventional banks and basic numeracy skills for financial decision making. Sample items might be: 'I understand how profit and loss sharing works in Islamic banking products' and 'I am able to compare various Islamic banking products and determine the one that is best for me. The financial literacy scale developed by Lusardi and Mitchell (2011) has shown good validity in 25 countries ($\alpha = 0.76$-0.84).

Adoption Intention (DV) – 5 Items
Five items from the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) and Kim et al. (2009), adapted to the context of Islamic digital banking, were used to measure the intention to adopt. The items reflect the respondent's plans for Islamic digital banking services, the recommendability plans and intention to continue to interact with Islamic digital banking services. A sample item is: 'I intend to use Islamic digital banking services regularly in the future' and 'I plan to increase my use of Islamic digital banking services over the next six months'. Kim et al.'s (2009) scale on adoption intention is widely confirmed in mobile banking study and the Cronbach's α is 0.87–0.92.

Common Method Bias Control
To reduce common method bias (CMB), procedural and statistical corrective measures were used due to the self-reported nature of the survey data. The three waves of separation in time allowed for procedures to avoid collecting predictor and criterion measures at the same time (Podsakoff et al., 2003). To prevent socially desirable responding, respondents were told that their responses would be anonymous and would be voluntary (Chang et al., 2010). Harman's single factor test was used as a preliminary diagnostic in this study, as seen in the statistical tabulation of the items that were run through an exploratory factor analysis with a constraint of a single factor, then the variance explained was checked to ensure that it did not exceed the 50% mark (Podsakoff et al., 2003). Furthermore, the common latent factor method was used in the SmartPLS software to analyze the method variance (Eichhorn, 2014). Construct-level multicollinearity problems were ruled out by running a full collinearity assessment based on the variance inflation factor (VIF) and values less than 3.3 were considered acceptable (Kock, 2015).

PLS-SEM Analysis Strategy
Partial Least Squares Structural Equation Modeling (PLS-SEM) was chosen as the main analytical tool for the following reasons: (1) The study model involved the mediation and moderation pathways, which made variance-based PLS-SEM more suitable for this study than covariance-based SEM for theoretical extensions (Hair et al., 2019); (2) PLS-SEM does not require multivariate normality, which was the right choice for the study as the data was collected from a range of respondents from Pakistan; (3) PLS-SEM was found to be more suitable for the study as in the presence of reflective measurement models and a relatively small sample, PLS-SEM is more suitable for the study than CB-SEM (Hair et al., 2019; Ringle et al., 2015). This study adopted two stages of analytical procedure, which are suggested by Anderson and Gerbing (1988) and Hair et al. (2019). The reliability of the indicators, internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (AVE ≥ 0.50) and discriminant validity (HTMT ratio < 0.85, Henseler et al., 2015) were assessed in Stage 1. The structural model was assessed in Stage 2 using bootstrapping (5,000 subsamples), coefficient of determination (R^2), predictive relevance (Q^2 via blindfolding), and effect sizes (f^2).

Measurement Model Assessment
The reliability of the indicators was determined by the outer loading and values of ≥ 0.70 were regarded as acceptable (Hair et al., 2019). Cronbach's alpha ($\alpha \geq 0.70$) and composite reliability ($CR \geq 0.70$) were used to assess internal consistency. To test convergent validity, the average variance extracted ($AVE \geq 0.50$) was used, which showed that the variance of the indicators in each construct was higher than 50% (Fornell & Larcker, 1981). To test for discriminant validity, the HTMT criterion (Henseler et al., 2015) was used, as it has been found to be more effective than the Fornell-Larcker criterion in detecting discriminant validity failures.

Designing a structural model and hypothesis testing.
The path coefficient significance was analysed using bootstrapping with 5,000 replications which results in t statistics and the 95% confidence interval for each path (Hair et al., 2019; Preacher and Hayes, 2008). The two mediation hypotheses (H4a and H4b) were evaluated by the product of coefficients approach, which has been recommended by Preacher and Hayes (2008) and MacKinnon (2008). The moderated mediation hypothesis (H5) was tested by using the interaction term method provided by SmartPLS software, which was then mean-centered before the creation of interaction terms to prevent multicollinearity (Fassott et al., 2016; Hair et al., 2019). A Johnson-Neyman technique was used to determine the exact range of financial literacy values in which the moderation effect was found to be statistically significant (Hayes & Matthes, 2009).

Predictive Relevance
Model predictive relevance was evaluated by PLSpredict (Shmueli et al., 2019) software, which provides out-of-sample predictions for the endogenous constructs and compares the PLS-SEM predictions with that of a naive benchmark (linear regression). Blindfolding distance 7 (Fornell & Cha, 1994) was used to compute Q^2 values. Positive values of Q2 means the model has predictive power for the endogenous variables. The interpretation of effect sizes (f^2) adopted each individual path: 0.02 (small); 0.15 (medium); 0.35 (large) (Cohen, 1992).

Ethical Considerations

The study was carried out in compliance with the ethics guidelines of the Declaration of Helsinki and the ethical review guidelines of the hosting university. Consent was given, and all were informed volunteers. There was no personally identifiable information in the survey instrument, and all data was kept securely with access limited to the principal investigators. The participants were told that they could always refuse to take part in the study without any consequences.

Findings and Analysis

Measurement Model

The measurement model has high reliability and convergent validity and has no problems with multicollinearity. The reliability of indicators was satisfactory with all values above the recommended value of 0.70 (ranging from 0.852 to 0.918) and represented well the latent constructs. The item loading of Financial Literacy was the highest (FL2 = 0.918) showing good item performance. The internal consistency reliability was achieved by Cronbach's alpha coefficient (Cronbach α) ranging from 0.912 to 0.947 and Composite Reliability (CR) ranging from 0.934 to 0.958, which is above the standard of 0.70. The result also showed the convergent validity, with Average Variance Extracted (AVE) between 0.740 and 0.816, which is higher than 0.50 as recommended by Fornell and Larcker (1981). Moreover, the values of VIF were in the range of 1.007 to 1.202 which are below the level set by Kock (2015) of 3.3 indicating no concern of multicollinearity or common method bias.

Table 01
Reliability and validity

Construct	Item	Loading	Cronbach's Alpha	CR	AVE	VIF
AI	AI1	0.881	0.912	0.934	0.740	
	AI2	0.852	0.912	0.934	0.740	
	AI3	0.852	0.912	0.934	0.740	
	AI4	0.861	0.912	0.934	0.740	
	AI5	0.855	0.912	0.934	0.740	
DSQ	DSQ1	0.874	0.947	0.957	0.760	1.202
	DSQ2	0.859	0.947	0.957	0.760	
	DSQ3	0.876	0.947	0.957	0.760	
	DSQ4	0.885	0.947	0.957	0.760	
	DSQ5	0.869	0.947	0.957	0.760	
	DSQ6	0.863	0.947	0.957	0.760	
	DSQ7	0.879	0.947	0.957	0.760	
FL	FL1	0.899	0.944	0.957	0.816	
	FL2	0.918	0.944	0.957	0.816	
	FL3	0.901	0.944	0.957	0.816	
	FL4	0.906	0.944	0.957	0.816	
	FL5	0.893	0.944	0.957	0.816	
IFTI	IFTI1	0.891	0.947	0.958	0.792	1.202
	IFTI2	0.878	0.947	0.958	0.792	
	IFTI3	0.897	0.947	0.958	0.792	
	IFTI4	0.887	0.947	0.958	0.792	
	IFTI5	0.895	0.947	0.958	0.792	
	IFTI6	0.891	0.947	0.958	0.792	
PT	PT1	0.861	0.938	0.951	0.763	1.007
	PT2	0.884	0.938	0.951	0.763	
	PT3	0.866	0.938	0.951	0.763	
	PT4	0.862	0.938	0.951	0.763	
	PT5	0.878	0.938	0.951	0.763	
	PT6	0.889	0.938	0.951	0.763	

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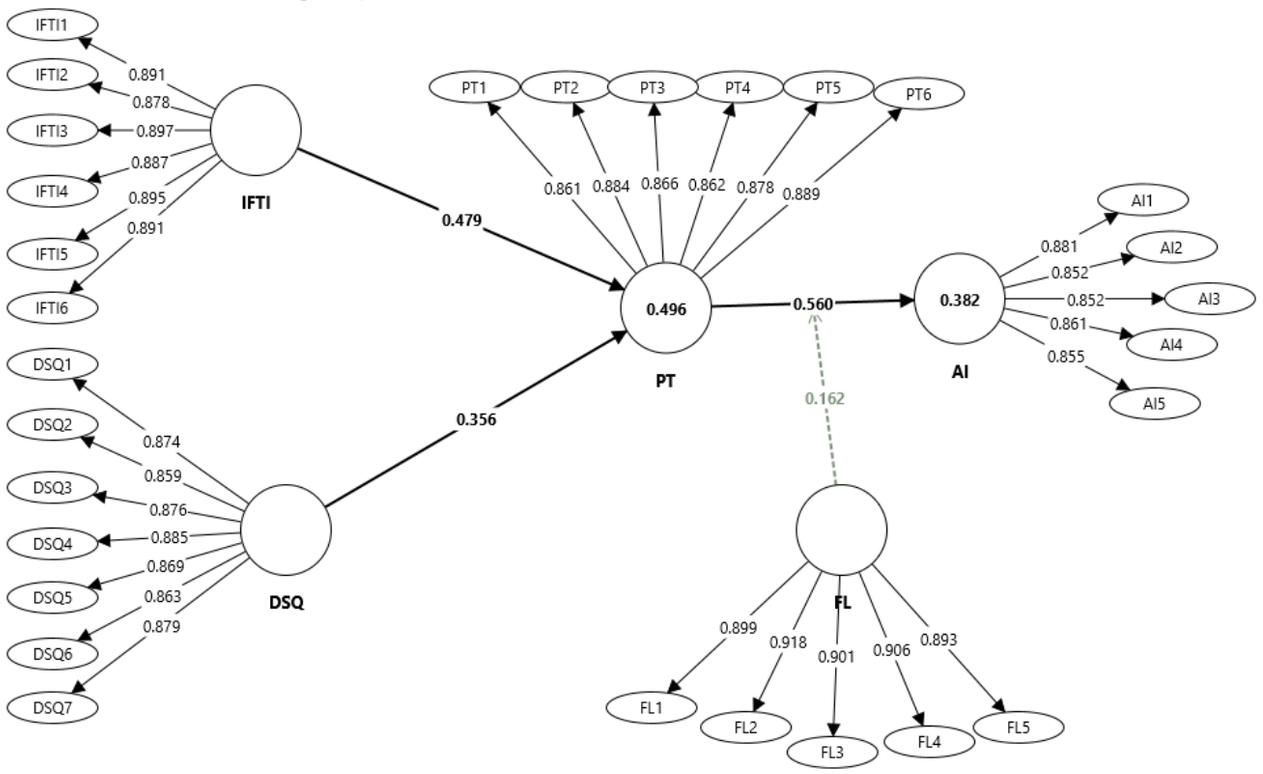

Figure 02: Measurement Model

Discriminant Validity

The correlation matrix shows that all constructs are positively correlated and lower than the significance level of 0.85, which indicates that there is no severe multicollinearity and discriminant validity (Hair et al., 2019; Henseler et al., 2015). The highest (positive) correlation is between Islamic FinTech Innovation (IFTI) and Perceived Trust (PT) with r = 0.662, which implies that if the customer has high perceptions of Islamic FinTech innovation, it enhances their perceived trust in Islamic digital banking platforms. PT also has strong positive correlations with the Digital Service Quality (DSQ) (r = 0.585) and Adoption Intention (AI) (r = 0.578), further emphasizing the key role of trust in adoption behavior. In addition, IFTI is moderately correlative with DSQ (r = 0.432) and AI (r = 0.399), which suggest that innovative and high-quality Islamic digital banking services positively impact the adoption intention. Financial Literacy (FL) has relatively weak correlations with other constructs, as it fits the theory in the model as a moderating variable.

Table 02
HTMT Criteria

Construct	AI	DSQ	FL	IFTI	PT
AI	0				
DSQ	0.340	0			
FL	0.253	0.125	0		
IFTI	0.399	0.432	0.071	0	
PT	0.578	0.585	0.064	0.662	0

Structural Model

Path co-efficient

All the proposed hypotheses get strong empirical support from the structural model assessment. The findings show that Digital Service Quality (DSQ) has a significant positive relationship with Perceived Trust (PT) ($\beta = 0.356$, $t = 9.231$, $p < 0.001$) which implies that the existence of the Islamic digital banking service with good quality in terms of reliability, security and responsiveness will positively affect the customer's trust. Likewise, Islamic FinTech Innovation (IFTI) has a positive and significant correlation with PT ($\beta = 0.479$, $t = 13.595$, $p < 0.001$) indicating that in terms of innovations with technological advantage and Shariah compliance, Islamic digital banking platforms have a significant impact on strengthening trust. Moreover, PT has a significant impact on Adoption Intention (AI) ($\beta = 0.560$, $t = 15.604$, $p < 0.001$), thereby remaining the strongest predictor of the behavior of adopting Islamic digital banking.

As seen in the moderation analysis, Financial Literacy has a significant influence on the relationship between PT and AI ($\beta = 0.162$, $t = 4.282$, $p < 0.001$), meaning that the higher the Financial Literacy, the stronger the relationship between PT and AI. Further, mediation analysis indicates that the relationships between DSQ and AI, as well as IFTI and AI are significantly mediated by PT. The overall results indicate the good predictive power and theoretical consistency of the suggested framework.

Table 03
Hypotheses testing

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Relationship	Beta	STDV	T Value	P Value	CI LL (2.5%)	CI UL (97.5%)
DSQ→PT	0.356	0.039	9.231	0.000	0.279	0.431
IFTI→PT	0.479	0.035	13.595	0.000	0.408	0.547
PT→AI	0.560	0.036	15.604	0.000	0.488	0.628
FL*PT→AI	0.162	0.038	4.282	0.000	0.085	0.233
DSQ→PT→AI	0.199	0.025	7.962	0.000	0.152	0.249
IFTI→PT→AI	0.268	0.028	9.485	0.000	0.214	0.324

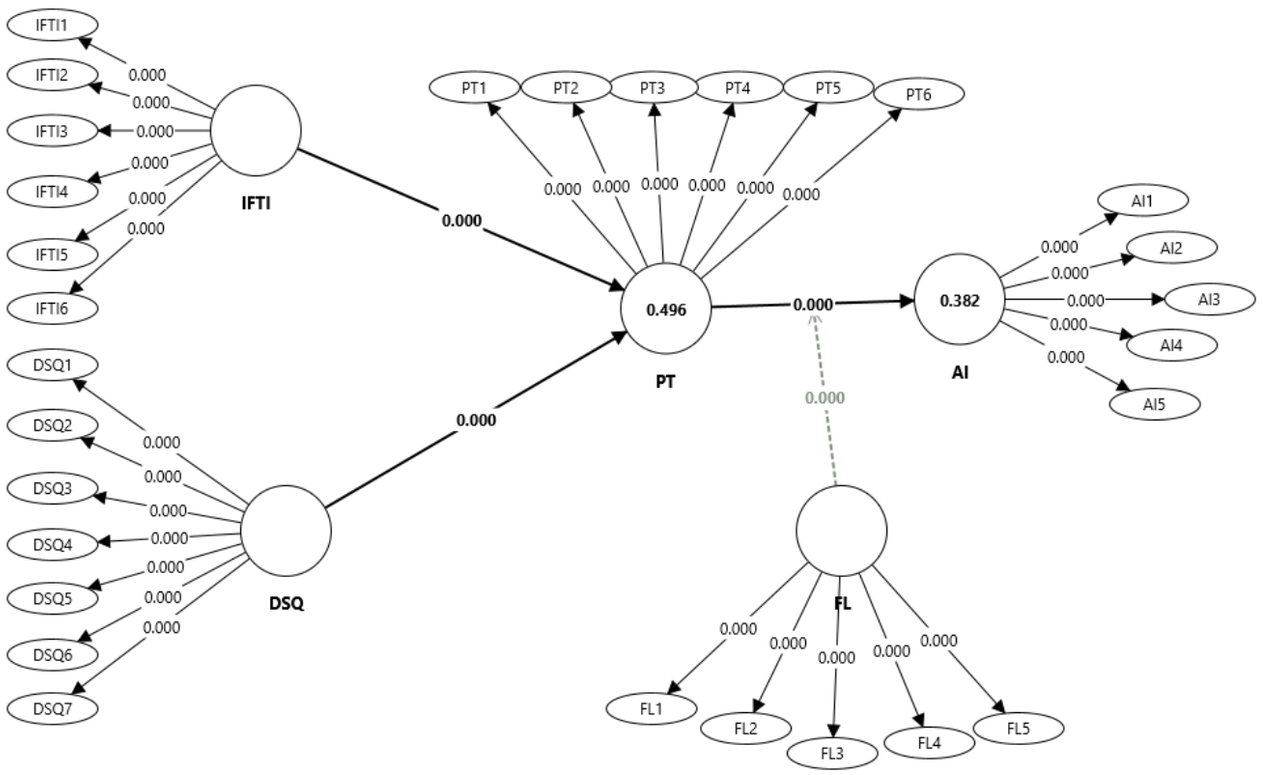

Figure 03: Structural Model

Variance in endogenous variable

The R^2 results show good power of the model to explain the results. Adoption Intention (AI) shows an R^2 of 0.382, which means that the predictor variables in the model account for 38.2% of the variance in AI. Likewise, Perceived Trust (PT) has an R^2 value of 0.496 which means that 49.6% of the variation in perceived trust is accounted by Islamic FinTech Innovation and Digital Service Quality. The adjusted R^2 values are very close to the original R^2 values, indicating stability and robustness of the structural model. Overall, the model's predictive power and its explanatory ability in the context of explaining the behavior of Islamic digital banking are moderate.

Table 04
R- Square Values

Construct	R-square	R-square Adjusted
AI	0.382	0.378
PT	0.496	0.494

Effect size

These f^2 effect size results show the relative contribution of each predictor construct to the endogenous constructs. Cohen (1992) states that f^2 values of 0.02, 0.15, and 0.35 are small, medium, and large effects, respectively. Islamic FinTech Innovation (IFTI → PT) shows a large effect size ($f^2 = 0.379$) on Perceived Trust, suggesting Islamic FinTech innovation is a strong determinant of trust in Islamic digital banking. Similarly, Perceived Trust (PT → AI) has a very high effect size ($f^2 = 0.503$) influencing the Adoption Intention, which indicates that trust has the greatest influence on Islamic digital banking adoption behavior. The effect size for Digital Service Quality (DSQ → PT) is medium ($f^2 = 0.210$) and therefore, service quality plays a meaningful role in building customer trust. The interaction effect of Financial Literacy and Perceived Trust on Adoption Intention (FL × PT → AI) demonstrates a moderate effect size ($f^2 = 0.041$), suggesting that while the interaction is statistically significant, it does not have a substantial impact on the adoption intention. Overall the results show that the three constructs that influence the structural model the most are Perceived Trust and Islamic FinTech Innovation. Overall, it can be concluded that Perceived Trust and Islamic FinTech Innovation are the most influential constructs in the structural model.

Table 05
F Square values

Relationship	f-square
DSQ→PT	0.210
IFTI→PT	0.379
PT→AI	0.503
FL*PT→AI	0.041

Blind folding

The predictive relevance of the structural model was tested for the Q^2 values by following the blindfolding procedure. Fornell and Cha (1994) recommend that Q^2 values be > zero as a sign of the model's predictive relevance for the endogenous constructs. These results indicate that the Q^2 value for Adoption Intention (AI) is 0.279 and Perceived Trust (PT) is 0.375. Both values are much greater than zero suggesting that the model is well suited for prediction. Moreover, the results indicate that the predictor constructs – Islamic FinTech Innovation and Digital Service Quality – have more predictive power for the formation of trust than for the prediction of the intention to adopt the digital service. In general, the results of the Q^2 indicate that the structural model has a suitable predictive capacity and thus the predictive validity of the proposed structural model is supported.

Table 06
Q square values

Construct	SSO	SSE	$Q^2 = 1 - (SSE/SSO)$
AI	1935.000	1394.231	0.279
PT	2322.000	1450.125	0.375

Predictive relevance

The CVPAT results have shown that the model of PLS-SEM has a high predictive performance compared to the indicator average (IA) model. The predictive accuracy of the proposed model for both endogenous constructs (Adoption Intention (AI) and Perceived Trust (PT)) likewise is better compared to the IA loss values. In particular, the PLS loss is 3.345 points less than the IA loss of 4.049 points, and the difference is 0.704 points ($t = 5.833$, $p < 0.001$). Likewise, the PLS loss of Perceived Trust (PT) is much lower at 2.534 than the IA loss of 4.049, with a significant difference of −1.515 ($t = 9.347$, $p < 0.001$). The overall difference of CVPAT was also in favour of the PLS model ($t = 9.469$, $p < 0.001$). All p values are significant, and the differences are negative, which is consistent with the results that the PLS-SEM model is able to predict with a significantly high accuracy compared to the naive benchmark model. Overall, the CVPAT analysis supports the out-of-sample predictive validity and robustness of the proposed framework.

Table 07
CVPAT

Construct	PLS Loss	IA Loss	Difference	t-value	p-value
AI	3.345	4.049	-0.704	5.833	0.000
PT	2.534	4.049	-1.515	9.347	0.000
Overall	2.903	4.049	-1.146	9.469	0.000

Discussion

This study's results have offered robust empirical evidence to support the proposed moderated-mediation model for the investigation of Islamic digital banking adoption in Pakistan. The results show that Islamic FinTech Innovation and Digital Service Quality have a significant contribution to Perceived Trust, which in turn positively influenced Adoption Intention. The digital financial services, technologically advanced and Sharia-compliant services (Islamic FinTech Innovation) exhibited the greatest effect on trust among a host of antecedents that were considered, suggesting that advancement of the digital financial services in terms of technology and Shariah compliance is critical in enhancing consumer trust in Islamic digital banking. The results align with the earlier research highlighting the significance of innovation and service quality of FinTech in digital financial inclusion (Rabbani et al., 2021; Raza et al., 2022).

The significant relationship of Perceived Trust with Adoption Intention once again supports the fact that trust is the key psychological factor that affects digital banking behaviour in Islamic financial contexts. The findings align with Trust Theory and validate previous evidence showing that consumers are more inclined to embrace digital banking services if they believe that it is reliable, transparent, secure, and complies with Shariah (Gefen et al., 2003; Alam et al., 2021). The moderation analysis also illustrates that Financial Literacy enhances the relationship between trust and intention to adopt. Consumers who are financially literate will be more able to comprehend the digital financial products provided by Islamic financial services, and also more inclined to convert their trust into actual usage actions. The mediation results also validate that trust is a key psychological link between digital banking stimuli and behavioural outcomes. In general, the study supports the application of integrated TAM, S-O-R and Trust Theory framework in the Pakistani Islamic banking context.

Theoretical Implications

The study has several noteworthy theoretical contributions to the literature in Islamic digital banking and FinTech. The first contribution is the extension of the Technology Acceptance Model (TAM) with Islamic FinTech Innovation as a new predictor rather than FinTech innovation as a generic concept of technology. This gives a more nuanced glimpse into the adoption of Islamic digital banking. Secondly, the results provide empirical evidence and further support the validity of the Stimulus-Organism-Response (S-O-R) framework by empowering the role of Perceived Trust as the psychological organism between external digital banking stimuli and digital banking adoption. The study validates the trust as the central mechanism that is acting as the mediating factor in the Islamic financial environment. Thirdly, the study adds to Trust Theory by introducing the notion of Shariah-compliance trust in digital banking systems. Lastly, the moderating effect of Financial Literacy adds to the boundary condition literature by showing that consumers' financial knowledge is a major factor that affects the relationship between trust and adoption intention. The study results offer an integrated and theoretically sound framework to comprehend Islamic digital banking adoption in emerging markets like Pakistan.

Practical Implications

The conclusions offer a number of practical recommendations for policymakers, FinTech companies, and Islamic banks in Pakistan. Investment in new and technologically advanced Shariah-compliant digital banking is one of the ways that better Islamic financial institutions can build customer trust, according to Islamic financial institutions. Islamic financial institutions found that Islamic financial Institutions must invest more in innovative and technologically advanced Shariah-compliant digital banking solutions to develop customer trust. The use of AI that includes advisory systems, safe digital payment solutions, and easy-to-use Islamic banking apps can greatly enhance consumer trust. Secondly, Islamic banks need to enhance the Digital Service quality on a continuous basis by maintaining reliability, security, responsiveness, and ease of use in their digital platform. Trust plays a significant role in the intention of adopting the product; therefore, banks need to pay attention to transparency, and communicate the Shariah compliance effectively to customers. Third, policy makers and State Bank of Pakistan (SBP) should create a national financial literacy initiative to strengthen the knowledge of the consumers on Islamic financial products and digital banking mechanisms. The moderation results show that if a consumer has trust, then he/she is more likely to use Islamic digital banking services, if the consumer is financially literate. Thus, enhancing financial literacy can fast track digital financial inclusion and facilitate overall digitalization of Pakistan's Islamic banking system.

Discuss the limitations of this study and what could be done differently in the future.

This study has a number of limitations. Although the study was conducted with a three-wave time-lagged design, the data was self-reported, so there was potential for response bias. Behavioral and/or transactional banking information could be added to future studies to enhance findings. Second, this study is confined to the market of Pakistan, and therefore the conclusions may not be generalized to other markets in Islamic banking. Further studies should be done to make cross-country comparisons with other Muslim majority economies like Malaysia, Indonesia, Saudi Arabia, and UAE. Third, only one mediator and one moderator were treated. The framework could be expanded in forthcoming research with other psychological and technological factors including perceived risk, religiosity, digital awareness, cyber security concerns, customer satisfaction, or technology readiness.

Lastly, future research could consider using a longitudinal or mixed methods design to better capture changes in consumer trust in and digital banking practices over time in dynamic FinTech settings.

Conclusion

The study explored the effect of Islamic FinTech Innovation and the Digital Service Quality on Adoption Intention of Islamic digital banking and found that Perceived Trust acts as a mediator between Islamic FinTech Innovation and the Adoption Intention of Islamic digital banking, whereas Financial Literacy moderates the relationship between Digital Service Quality and the Adoption Intention of Islamic digital banking. A three-wave time-lagged design and PLS-SEM analyses were used to confirm the findings as both Islamic FinTech Innovation and Digital Service Quality significantly improve Perceived Trust and in turn, this increases customers' intention to adopt Islamic digital banking services. The study also found that the positive correlation between the variables of trust and intention to adopt was further reinforced by Financial Literacy, thus, consumers who are financially knowledgeable are more likely to translate trust into adoption. The results also supported the important mediating role of Perceived Trust, which is a psychological mechanism between technological and service factors and behavioral outcomes. Overall, the study contributes to Islamic digital banking literature by integrating TAM, S-O-R framework, and Trust Theory into a comprehensive moderated mediation framework. The findings provide valuable theoretical insights and practical guidance for Islamic banks, FinTech providers, and policymakers seeking to enhance digital banking adoption and financial inclusion in Pakistan.

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