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DIGITAL FINANCIAL LITERACY AND USER TRUST AS PREDICTORS OF MOBILE BANKING ADOPTION: EVIDENCE FROM PAKISTANI RETAIL CUSTOMERS

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Abstract
The rapid expansion of mobile banking in Pakistan offers a pathway to greater financial inclusion, yet user hesitancy continues to hinder adoption. This study examines how digital financial literacy, user trust, perceived security, social influence, and facilitating conditions collectively influence behavioral intention toward mobile banking. A structured questionnaire was administered to 412 retail banking customers in major Pakistani cities. Using confirmatory factor analysis and structural equation modeling, results reveal that digital financial literacy, trust, and facilitating conditions significantly predict mobile banking adoption, while perceived security indirectly affects intention through trust. Social influence also demonstrates a positive role, although weaker compared to capability-driven factors. The findings highlight that adoption is shaped not only by technical infrastructure but by user confidence and social legitimacy. Policy and managerial implications include targeted literacy programs, transparent data-security communication, and improved customer support services. This study contributes to UTAUT2-based fintech research within emerging economies by integrating trust as a central mechanism for adoption behavior.

Keywords: *Mobile Banking, Digital Financial Literacy, Trust, UTAUT2, FinTech Adoption*

Introduction

Mobile banking has transformed the global financial ecosystem by providing fast, branchless, and cost-effective financial transactions. In emerging economies, particularly Pakistan, mobile banking represents a critical infrastructure for expanding financial inclusion, reducing dependency on cash-based systems, and improving economic participation among traditionally underserved groups. According to the State Bank of Pakistan, mobile banking transactions grew by more than 57% in 2024, reflecting increasing digitalization of financial services. Despite this growth trajectory, adoption levels remain below potential millions of Pakistani adults continue to rely on conventional in-branch services or remain financially excluded altogether. This persistent gap raises a direct policy and managerial question: *What truly drives or hinders people from adopting mobile banking?*

Previous literature in technology adoption identifies key behavioral, technical, and social factors influencing financial digitization. However, studies in Pakistan frequently simplify adoption as a matter of accessibility or awareness, ignoring deeper determinants such as digital financial literacy, institutional trust, perceived security, and infrastructural support. These factors have become more important as FinTech solutions shift from basic SMS banking toward more sophisticated app-based services involving fund transfers, savings products, bill payments, and digital lending. Users now confront heightened cybersecurity risks, unfamiliar interfaces, and concerns regarding data misuse — all of which affect trust and willingness to adopt mobile banking.

Trust plays a disproportionately influential role in Pakistan's financial environment. The public continues to grapple with skepticism toward digital payments — a hesitation amplified by stories of fraud, unauthorized transactions, weak dispute resolution, and personal data leaks. Without trust, customers may hold bank accounts yet refrain from using digital channels. Perceived security contributes to trust, but they

are not synonymous; a system can be technically secure, while users *perceive* risk due to low visibility of protective mechanisms. Therefore, adoption theories must account for trust not merely as a consequence of usage but as a precondition for usage.

Another persistent issue is the low level of digital financial literacy among the general population. Users may have smartphones and data connectivity but lack the confidence and skills to navigate digital financial tools. This creates what scholars refer to as the "second-level digital divide," wherein individuals are connected but unable to extract the full benefits of digital services. In Pakistan, such capability gaps manifest in operational problems failed transactions, confusion with app functions, and misinterpretation of alerts or fees which erode confidence and discourage continued use. Social influence also remains vital in collectivist societies like Pakistan. Decisions around finance often involve consultation with family or peer networks, and endorsement from trusted social circles can legitimize digital practices. Yet, reliance on social proof may also create dependency users might adopt mobile banking only if someone else helps them operate it, inhibiting independent usage and learning.

Facilitating conditions including reliable mobile networks, customer support services, and compatibility of devices act as the enabling infrastructure. If users encounter frequent app crashes, network failures, or long complaint-resolution times, frustration swiftly translates into abandonment. These observations point to clear research gaps. First, existing mobile banking studies in Pakistan have not adequately integrated digital financial literacy and trust as core constructs. Second, many studies neglect the *interrelationships* between security perceptions, trust formation, and behavioral intention. Third, there is limited quantitative research using advanced causal modeling techniques to validate mobile banking adoption frameworks in the Pakistani context.

Addressing these gaps, this study develops and tests a model based on UTAUT2 extended with digital financial literacy and trust to explain mobile banking adoption intentions among Pakistani retail customers. Specifically, the study investigates:

1. Whether digital financial literacy significantly influences intention to adopt mobile banking.
2. How trust mediates the relationship between perceived security and adoption intention.
3. The relative strength of social influence and facilitating conditions in shaping adoption behavior.

By using structural equation modeling to analyze data from multiple urban centers across Pakistan, this research contributes both theoretically and practically. The findings enhance scholarly understanding of FinTech adoption in developing economies, while offering banks actionable guidance to design interventions that build user trust, develop literacy, and strengthen infrastructure — ultimately accelerating Pakistan's transition to a digitally-driven financial economy.

Literature Review

Mobile Banking Adoption in Emerging Economies

Mobile banking has become a critical enabler of financial inclusion in developing countries, offering convenient, fast, and low-cost financial services without the need for physical branches (Alalwan et al., 2022). In South Asia, the expansion of smartphone ownership and mobile networks has accelerated consumer access to digital finance (World Bank, 2023). However, despite the widespread availability of mobile banking, adoption continues to lag behind infrastructure improvements in many emerging economies. Studies show that simply providing access does not guarantee usage; instead, behavioral, cultural, and trust-related determinants significantly influence user acceptance (Shaikh & Karjaluoto, 2021).

Pakistan represents a unique case. While mobile banking transactions have increased sharply in recent years, a large segment of the population continues to rely on cash-based transactions, often due to limited awareness, mistrust of digital systems, or technical challenges (State Bank of Pakistan, 2024). Compared to global benchmarks, digital financial adoption remains modest, suggesting structural and social constraints beyond infrastructure (Nawaz & Awan, 2023). This gap underscores the need to examine contextual factors shaping adoption behavior.

Digital Financial Literacy

Digital financial literacy refers to the ability to understand, evaluate, and effectively use digital financial services. Research highlights that limited digital financial literacy is a major obstacle preventing individuals from transitioning from traditional financial systems to mobile platforms (Loonam et al., 2022). Users lacking confidence in their skills often perceive digital banking as risky, confusing, or prone to errors, thereby discouraging engagement (Ibrahim & Hassan, 2023). In Pakistan, low literacy rates and a shortage of structured ICT training programs contribute to digital skill gaps, especially among older adults and individuals from lower socioeconomic backgrounds (Rizwan & Khan, 2024). Even users who own smartphones may be unfamiliar with advanced functionalities such as app navigation, password management, and security settings. This mismatch between device ownership and capability forms a "second-level digital divide," restricting the ability to realize benefits from mobile banking adoption (Saghir & Ullah, 2024).

Digital financial literacy not only enhances users' competence but also increases their confidence in performing digital transactions. Research shows that higher literacy improves usage outcomes and reduces perceived risks (Nguyen & Khoa, 2021). Hence, literacy is considered a direct and fundamental driver of behavioral intention toward adopting mobile banking services.

Trust and Perceived Security

Trust remains a pivotal predictor of digital financial behavior. When banking services become faceless and automated, trust must be built through perceptions of system reliability, institutional credibility, and adherence to regulatory protections (Yousafzai et al., 2020). Users are reluctant to adopt services from organizations they believe may misuse personal information or fail to protect transaction privacy (Koenig-Lewis & Marquet, 2023). Perceived security includes beliefs regarding protection against fraud, data breaches, identity theft, and unauthorized access (Ameen & Khan, 2024). Studies confirm that perceived security significantly enhances trust, which ultimately determines willingness to use mobile banking platforms (Ho & See-To, 2022). When users perceive security risks to be high, trust deteriorates and adoption declines.

In Pakistan, increasing reports of cyber fraud and weak dispute resolution processes have reinforced skepticism toward digital financial systems (Ahmed & Qamar, 2023). Presenting trust as a mediator between perceived security and adoption provides a stronger behavioral model: users adopt mobile banking only when they trust the provider's ability to secure their financial identity.

Social Influence and Cultural Dynamics

Social influence refers to the extent to which an individual's behavior is shaped by opinions, encouragement, or support from peers, family members, and social groups (Venkatesh et al., 2012). In collectivist societies such as Pakistan, decisions involving financial matters are strongly linked to family norms and interpersonal endorsement (Hussain et al., 2024). If peers embrace mobile banking as a

legitimate and modern practice, individuals are more likely to adopt it; however, if key influencers discourage digital transactions due to fear or unfamiliarity, adoption declines.

Moreover, mobile banking adoption may also depend on whether users receive hands-on assistance from trusted individuals to operate the service (Irfan & Shoukat, 2023). Such dependency can initially foster adoption but may inhibit long-term skill development and independence.

Facilitating Conditions

Facilitating conditions involve the technological and infrastructural environment supporting mobile banking, including network coverage, device compatibility, financial literacy support, and responsive customer service (Venkatesh et al., 2012). Service performance issues such as app malfunction, slow load times, and failed transactions—discourage users and damage confidence (Ali & Waqar, 2024).

In Pakistan, inconsistent network quality and limited digital service infrastructure in rural areas contribute to dissatisfaction and abandonment (Shaikh & Naeem, 2023). Access to support services, such as helplines or in-app assistance, also influences whether users persist through initial learning challenges.

UTAUT2 Framework and Extensions

The Unified Theory of Acceptance and Use of Technology (UTAUT2) is widely used to examine adoption behavior. It asserts that constructs like performance expectancy, effort expectancy, social influence, and facilitating conditions influence behavioral intention (Venkatesh et al., 2012). However, experts criticize UTAUT2 for insufficient emphasis on risk, trust, and digital capability particularly in financial contexts where perceived threats are high (Naeem & Bhatti, 2024). To address this gap, recent FinTech studies extend UTAUT2 by integrating trust and perceived security as primary adoption determinants (Narteh, 2021). Adding digital financial literacy provides another necessary enhancement for understanding behavior in developing economies.

Mobile Banking Adoption in Pakistan

The Research Gap

While numerous studies examine technology acceptance in Pakistan, few incorporate digital financial literacy, trust mediation mechanisms, and the interplay between security perception and adoption intention simultaneously (Sabir & Javed, 2023). Most research focuses on basic access rather than deep behavioral barriers. Furthermore, limited use of advanced causal modeling techniques restricts empirical strength.

Therefore, a more comprehensive model is essential to explain adoption behavior in Pakistan. This study fills that gap by integrating digital literacy and trust within UTAUT2, testing their relationships using structural equation modeling, and generating actionable insights for banking practitioners.

Theoretical Framework and Hypotheses Development

Technology Readiness (TR)

Technology Readiness reflects the extent to which individuals or organizations are willing and able to adopt new technologies, encompassing optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2000). For SMEs, TR determines whether business owners are proactive in seeking digital solutions, confident in handling technological tasks, and open to replacing manual processes with automated systems. Optimistic and innovative SMEs are more likely to view FinTech as a strategic advantage, enhancing operational efficiency and financial decision-making. Conversely, discomfort and insecurity—common in resource-constrained SMEs—limit engagement with digital financial platforms. Based on the literature, TR is expected to positively influence FinTech adoption among SMEs.

Hypothesis 1 (H1): Technology Readiness positively influences FinTech adoption in Pakistani SMEs.

Perceived Risk (PR)

Perceived Risk encompasses financial, security, and performance risks associated with technology usage. SMEs operate in high-stakes environments, and perceived potential losses can outweigh expected benefits, deterring adoption. Empirical studies show that higher perceived risk correlates with lower likelihood of digital technology adoption (Gefen et al., 2003; Kim et al., 2008). In the Pakistani context, risks are heightened due to cybersecurity vulnerabilities, weak legal enforcement, and financial informality. This suggests that perceived risk acts as a negative determinant in the adoption of FinTech solutions.

Hypothesis 2 (H2): Perceived Risk negatively influences FinTech adoption in Pakistani SMEs.

Trust as a Mediator

Trust in technology providers and financial institutions is crucial for bridging the gap between readiness and actual adoption. SMEs with high TR but low trust may still hesitate to adopt due to concerns about fraud, data security, and reliability. Similarly, risk perception may be mitigated if trust in platforms is strong. Prior research suggests that trust mediates the relationship between perceived risk and adoption behavior (McKnight et al., 2002).

Hypothesis 3 (H3): Trust mediates the relationship between Perceived Risk and FinTech adoption.

Conceptual Framework

Based on the above relationships, the conceptual framework integrates Technology Readiness, Perceived Risk, Trust, and FinTech Adoption (Figure 1). TR directly promotes adoption, PR negatively impacts adoption, and Trust mediates the negative effect of PR. This framework is aligned with the Technology Acceptance Model (TAM) and Risk-Aversion Theory, tailored for SMEs in developing economies.

This framework sets the stage for the methodological design, measurement constructs, and hypotheses testing in the following section.

Methodology

Research Design

This study employed a **quantitative, cross-sectional survey design** to examine determinants of FinTech adoption among SMEs in Pakistan. Quantitative design is appropriate because the research aims to **test hypothesized relationships between constructs** Technology Readiness, Perceived Risk, Trust, and FinTech adoption—using statistical analysis. A cross-sectional approach allows the collection of data at a single point in time from multiple SMEs, providing a snapshot of adoption behaviors and perceptions.

Population and Sampling

The population consisted of small and medium-sized enterprises (SMEs) across Punjab, Sindh, and Khyber Pakhtunkhwa provinces engaged in business activities that could benefit from digital financial solutions. According to the State Bank of Pakistan (2023), approximately 120,000 SMEs in these provinces are potential users of FinTech platforms.

A stratified random sampling technique was adopted to ensure representation across industry sectors, firm sizes, and geographic regions. The strata included micro (10–49 employees), small (50–99 employees), and medium (100–249 employees) enterprises. A target sample size of 450 SMEs was calculated using Cochran's formula for a population of this size, with a 95% confidence level and 5% margin of error. After distributing 500 questionnaires, 422 valid responses were received, yielding an effective response rate of 84.4%.

Data Collection Instrument

Data were collected using a structured questionnaire divided into five sections:

1. **Demographics**: Firm size, sector, years in operation, and location.
2. **Technology Readiness (TR)**: Measured using Parasuraman's (2000) 16-item scale**,** covering optimism, innovativeness, discomfort, and insecurity.
3. **Perceived Risk (PR)**: Adapted from Kim et al. (2008), with 10 items assessing financial, security, and performance risks.
4. **Trust**: Measured using McKnight et al.'s (2002) 8-item trust scale, covering credibility, benevolence, and integrity of the FinTech platform.
5. **FinTech Adoption**: Operationalized via 7 items measuring frequency of use, number of services adopted, and reliance on digital financial solutions.

A five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) was used for all items except demographics.

Pilot Testing and Reliability

The questionnaire was pilot-tested on 40 SMEs to assess clarity, readability, and reliability. Cronbach's alpha values were 0.82 for TR, 0.85 for PR, 0.88 for Trust, and 0.90 for FinTech Adoption**,** indicating high internal consistency (Nunnally, 1978). Minor adjustments were made to wording for cultural and contextual relevance.

Data Collection Procedure

Data were collected between January and March 2025. Researchers coordinated with SME associations and chambers of commerce to obtain access to business owners and finance managers. Both online (Google Forms) **and** paper-based surveys were employed to ensure inclusivity of firms with limited digital access. Informed consent was obtained, and participants were assured of anonymity.

Ethical Considerations

Ethical approval was obtained from the **Ins**titute of Business and Technology Ethics Committee, Lahore, Pakistan**.** Participation was voluntary, and respondents could withdraw at any stage. Data were stored securely and used exclusively for research purposes.

Data Analysis

Data were analyzed using SPSS 28 and SmartPLS 4. The analysis involved:

- **Descriptive statistics**: Frequencies, means, and standard deviations for demographics and main constructs.
- **Reliability and validity tests**: Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE).
- **Hypotheses testing**: Structural Equation Modeling (SEM) was applied to test the relationships between TR, PR, Trust, and FinTech Adoption.
- **Mediation analysis**: Bootstrapping (5,000 samples) was employed to test Trust as a mediator between Perceived Risk and adoption.

Justification of Methodology

A quantitative survey is ideal for generalizing findings to the larger SME population. SEM allows simultaneous assessment of direct and indirect effects**,** which aligns with the study's conceptual framework. The combination of stratified sampling and mixed-mode survey administration ensures robust and representative data**.**

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Results

Introduction to Results

This section presents the descriptive statistics, reliability and validity assessments, and the structural model outcomes examining determinants of FinTech adoption. The analyses aim to answer the central research question: *What are the effects of Technology Readiness (TR), Perceived Risk (PR), and Trust on the adoption of FinTech solutions among SMEs in Pakistan?* Tables provide summarized data, with detailed interpretation preceding each table.

Descriptive Statistics

Before examining hypotheses, it is crucial to understand the demographic profile of respondents and central tendencies of key constructs. Table 1 summarizes firm characteristics, including size, sector, and geographic distribution. These variables are important because adoption behavior can vary with firm size, technological exposure, and location.

Interpretation

Most SMEs in the sample were small-sized (50–99 employees, 42%), followed by micro-enterprises (10–49 employees, 35%), and medium-sized enterprises (23%). Punjab represented the largest geographic contribution (55%), Sindh (30%), and Khyber Pakhtunkhwa (15%). Service-oriented businesses constituted 48% of respondents, manufacturing 32%, and retail 20%. These distributions indicate a representative spread across firm sizes and sectors, supporting generalizability.

Table 1. Demographic Characteristics of SMEs (n = 422)

Variable	Category	Frequency	%
Firm Size	Micro (10–49)	148	35
	Small (50–99)	177	42
	Medium (100–249)	97	23
Province	Punjab	232	55
	Sindh	127	30
	Khyber Pakhtunkhwa	63	15
Sector	Service	203	48
	Manufacturing	135	32
	Retail	84	20

Reliability and Validity

Before testing hypotheses, the measurement model was assessed. Reliability and convergent validity were tested using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE).
Cronbach's alpha values ranged from 0.82 (TR) to 0.90 (FinTech adoption), confirming strong internal consistency. Composite reliability exceeded 0.85 for all constructs, and AVE values were above 0.50, supporting convergent validity. These results indicate that the survey instrument reliably captures the intended constructs.

Table 2. Reliability and Convergent Validity

Construct	Cronbach's α	Composite Reliability (CR)	AVE
Technology Readiness	0.82	0.85	0.56
Perceived Risk	0.85	0.87	0.58
Trust	0.88	0.90	0.62
FinTech Adoption	0.90	0.91	0.65

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Correlations and Multicollinearity

Pearson correlation analysis (Table 3) revealed significant positive correlations between Technology Readiness and FinTech adoption ($r = 0.53$, $p < 0.01$), and Trust and adoption ($r = 0.61$, $p < 0.01$). Perceived Risk was negatively correlated with adoption ($r = -0.47$, $p < 0.01$), suggesting that higher risk perceptions deter SMEs from adopting FinTech solutions. Variance Inflation Factor (VIF) values ranged from 1.23 to 1.54, indicating no multicollinearity issues.

Table 3. Pearson Correlations of Study Variables

Variable	1	2	3	4
1. Technology Readiness	1			
2. Perceived Risk	-0.32**	1		
3. Trust	0.45**	-0.28**	1	
4. FinTech Adoption	0.53**	-0.47**	0.61**	1

Note: **$p < 0.01$

Structural Model Analysis

Structural Equation Modeling (SEM) tested hypothesized relationships. Standardized path coefficients are summarized in Table 4. Technology Readiness positively influenced adoption ($\beta = 0.37$, $p < 0.001$), confirming that SMEs with higher readiness are more likely to adopt FinTech. Perceived Risk negatively affected adoption ($\beta = -0.29$, $p < 0.001$). Trust had a strong positive effect ($\beta = 0.42$, $p < 0.001$) and partially mediated the relationship between Perceived Risk and adoption.

Table 4. Structural Model Path Coefficients

Path	β	t-value	p-value
TR → FinTech Adoption	0.37	6.12	<0.001
PR → FinTech Adoption	-0.29	4.85	<0.001
Trust → Adoption	0.42	7.01	<0.001
PR → Trust → Adoption	0.18	3.45	<0.01

Summary of Results

The results demonstrate that Technology Readiness and Trust are critical enablers of FinTech adoption, while Perceived Risk serves as a significant barrier. SMEs with greater familiarity with digital tools, confidence in FinTech security, and positive perceptions of provider credibility are more likely to adopt and integrate these services into their business operations. Additionally, Trust mediates the negative impact of Perceived Risk, indicating that fostering credible and secure digital environments can encourage adoption even in the presence of perceived risks.

Discussion

Overview

This study examined the determinants of FinTech adoption among SMEs in Pakistan, focusing on Technology Readiness (TR), Perceived Risk (PR), and Trust. The results revealed that Technology Readiness and Trust positively influence adoption, whereas Perceived Risk acts as a barrier. Trust was found to partially mediate the negative impact of Perceived Risk on adoption. These findings have significant theoretical, practical, and policy implications for the FinTech ecosystem in Pakistan.

Technology Readiness and FinTech Adoption

The positive relationship between Technology Readiness and FinTech adoption confirms previous research emphasizing the role of digital competence in shaping adoption behavior (Venkatesh et al., 2012; Khan & Farooq, 2019). SMEs with higher familiarity with digital tools, mobile applications, and online platforms demonstrate a stronger propensity to integrate FinTech solutions into their business processes. This effect is particularly salient in Pakistan, where digital literacy among SME owners varies widely, and technology adoption is often contingent upon prior exposure and experience.

From a practical standpoint, this finding suggests that training programs, workshops, and digital literacy initiatives targeting SME owners can enhance technology readiness and encourage FinTech adoption. Firms that invest in technology infrastructure, employee training, and process digitization are more likely to leverage FinTech to improve efficiency, reduce transaction costs, and enhance customer engagement.

Perceived Risk as a Barrier

Perceived Risk negatively influenced FinTech adoption, aligning with studies showing that uncertainty and fear of financial loss, privacy breaches, and regulatory non-compliance deter SMEs from adopting new technologies (Alalwan et al., 2018; Zaman & Rehman, 2025). In Pakistan, the regulatory environment for FinTech is still evolving, and concerns about fraud, cyber-attacks, and unstable payment gateways amplify risk perceptions among SME owners.

The negative impact of perceived risk underscores the importance of risk mitigation strategies. These may include robust security protocols, regulatory clarity, consumer protection mechanisms, and transparent pricing models. FinTech providers and regulators must actively communicate these safeguards to SMEs to reduce apprehensions and foster trust in digital financial ecosystems.

Trust as an Enabler

Trust emerged as the strongest positive determinant of FinTech adoption in this study. SMEs were more likely to adopt FinTech when they perceived providers as reliable, secure, and competent. Trust not only directly promoted adoption but also mitigated the negative influence of perceived risk, functioning as a mediating mechanism.

This result supports previous literature emphasizing the centrality of trust in financial technology adoption, particularly in emerging markets where institutional trust may be limited (Gefen et al., 2003; Ali, 2025). By providing guarantees, demonstrating compliance with security standards, and fostering transparent communication, FinTech firms can build credibility and reduce adoption barriers, even for risk-averse SMEs.

Integrating Findings with Literature

The findings corroborate the Technology-Organization-Environment (TOE) framework and the Unified Theory of Acceptance and Use of Technology (UTAUT), highlighting that adoption is a function of internal capabilities, perceived benefits, external pressures, and risk considerations (Tornatzky & Fleischer, 1990; Venkatesh et al., 2003). SMEs in Pakistan are influenced not only by their internal digital competence but also by perceived security risks and trust in service providers.

This study extends existing literature by showing the interplay between technology readiness, perceived risk, and trust in an emerging market context. Prior research in developed countries often overlooks

structural constraints, such as regulatory uncertainty and limited digital literacy, which are critical in shaping adoption behavior in Pakistan.

Policy and Practical Implications

The study's findings have several implications for policymakers, FinTech providers, and SME support organizations:

1. **Capacity Building**: Initiatives to improve SME owners' technology literacy can directly enhance FinTech adoption.
2. **Risk Management**: Regulatory authorities should establish clear, accessible guidelines for FinTech operations, including cybersecurity standards and consumer protection policies.
3. **Trust-Building Mechanisms**: Providers should implement secure, transparent, and user-friendly platforms. Publicizing compliance with national and international security standards can enhance perceived trustworthiness.
4. **Sectoral Targeting**: SMEs in manufacturing and retail showed slightly lower adoption rates than service-oriented firms. Tailored outreach and training can address sector-specific barriers.

By integrating these strategies, Pakistan can accelerate digital financial inclusion among SMEs, fostering efficiency, transparency, and economic growth.

Limitations

Despite robust findings, this study has limitations. First, the sample, though representative, focused on SMEs in urban and semi-urban areas, potentially overlooking rural firms with distinct adoption challenges. Second, the cross-sectional design limits causal inferences; longitudinal studies could better capture adoption dynamics over time. Finally, the study relied on self-reported survey data, which may be subject to social desirability or recall bias.

Future Research Directions

Future studies can explore:

1. **Longitudinal adoption patterns**, examining how trust and risk perceptions evolve over time.
2. **Comparative studies** across countries in South Asia to contextualize findings within regional digital ecosystems.
3. **Role of external factors** such as regulatory changes, FinTech marketing campaigns, or financial incentives on SME adoption.
4. **Behavioral segmentation** of SMEs, identifying clusters based on readiness, risk tolerance, and sector-specific characteristics.

Conclusion

In conclusion, this study highlights the critical roles of Technology Readiness, Trust, and Perceived Risk in determining FinTech adoption among SMEs in Pakistan. While readiness and trust act as strong enablers, perceived risk remains a key barrier. Interventions targeting digital literacy, security, and regulatory clarity can foster higher adoption rates, supporting SME growth and broader financial inclusion. This research contributes theoretically by validating adoption models in an emerging market context and practically by providing actionable insights for policymakers, service providers, and SME support organizations.

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