

FINTECH-ENABLED FINANCIAL INCLUSION AND SME GROWTH: EVALUATING THE ROLE OF DIGITAL CREDIT ECOSYSTEMS AND BEHAVIORAL TRUST IN PAKISTAN'S EMERGING ECONOMY

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DOI: <https://doi.org/10.5281/zenodo.21273431>

Keywords

FinTech-enabled financial inclusion; SME growth; digital credit ecosystems; behavioral trust; Pakistan; UTAUT.

Article History

Received: 24 April 2026

Accepted: 06 June 2026

Published: 21 June 2026

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Abstract

Financial technology (FinTech) has transformed financial service delivery by expanding access to digital financial products and reducing financing constraints for small and medium-sized enterprises (SMEs). Despite substantial growth in Pakistan's digital financial ecosystem, many SMEs continue to face limited access to formal credit, hindering their growth and competitiveness. This study examined the effect of FinTech-enabled financial inclusion on SME growth by investigating the mediating role of digital credit ecosystems and the moderating role of behavioral trust within Pakistan's emerging economy. A quantitative, explanatory, and cross-sectional research design was employed. Primary data were collected through a structured questionnaire administered to 387 SME owners and senior managers selected using stratified random sampling from various economic sectors across Pakistan. The proposed research model was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicated that FinTech-enabled financial inclusion significantly enhanced SME growth and positively influenced the development of digital credit ecosystems. Digital credit ecosystems were found to partially mediate the relationship between FinTech-enabled financial inclusion and SME growth, demonstrating that efficient digital lending mechanisms are essential for translating financial inclusion into improved business performance. Furthermore, behavioral trust significantly strengthened the relationship between digital credit ecosystems and SME growth, highlighting the importance of trust in encouraging SMEs' adoption and sustained use of digital financial services. The study contributes to the literature by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) with digital financial inclusion and SME development, providing a comprehensive framework for understanding technology-enabled enterprise growth in emerging economies. The findings offer practical implications for policymakers, financial institutions, FinTech firms, and SME managers by emphasizing the need to strengthen digital financial infrastructure, enhance cybersecurity, improve digital financial literacy, and develop inclusive digital credit ecosystems to support sustainable economic development in Pakistan.

INTRODUCTION

Small and medium-sized enterprises (SMEs) constitute the backbone of Pakistan's economy by contributing significantly to employment generation, innovation, industrial diversification, and gross domestic product (GDP). Despite their critical role, SMEs continue to face persistent financing constraints due to limited collateral, inadequate credit histories, high transaction costs, and stringent lending requirements imposed by conventional financial institutions. These structural barriers restrict SMEs' access to formal financial services, thereby limiting their capacity for growth, innovation, and competitiveness (Beck & Demirgüç-Kunt, 2006; OECD, 2023).

The rapid advancement of financial technology (FinTech) has transformed the financial services landscape by introducing innovative digital platforms that facilitate greater financial inclusion. FinTech-enabled financial inclusion extends access to affordable, convenient, and efficient financial services through mobile banking, digital wallets, peer-to-peer lending, blockchain-based financial services, and artificial intelligence (AI)-driven credit assessment. These innovations have reduced information asymmetries, lowered transaction costs, and expanded access to finance for underserved populations and SMEs that have traditionally been excluded from formal banking systems (Gomber et al., 2018; Lee & Shin, 2018).

In emerging economies such as Pakistan, digital financial services have experienced substantial growth owing to increased smartphone penetration, expanding internet connectivity, supportive regulatory reforms, and government initiatives promoting digital transformation. The State Bank of Pakistan's Digital Financial Services Strategy and the implementation of Raast, the national instant payment system, have accelerated digital payment adoption and enhanced financial accessibility across the country. Nevertheless, disparities remain in the utilization of digital financial services among SMEs, particularly in rural and semi-urban regions where financial literacy and digital infrastructure remain underdeveloped (State Bank of Pakistan, 2023).

An important mechanism through which FinTech contributes to SME development is the emergence of digital credit ecosystems. These ecosystems integrate financial institutions, FinTech firms, digital platforms, payment providers, data analytics, and alternative credit scoring technologies to create more inclusive and efficient lending environments. Unlike traditional lending models, digital credit ecosystems utilize transactional data, mobile payment histories, e-commerce activities, and AI-based algorithms to evaluate borrowers' creditworthiness, thereby expanding financing opportunities for SMEs with limited formal credit records (Bazarbash, 2019).

However, access to digital finance alone does not guarantee successful adoption or business growth. Behavioral trust has emerged as a critical determinant influencing SMEs' willingness to adopt and continuously utilize digital financial services. Behavioral trust encompasses users' confidence in the security, reliability, transparency, and integrity of FinTech platforms. Higher levels of trust reduce perceived risks associated with digital transactions, encourage greater reliance on digital financial services, and strengthen the effectiveness of digital credit ecosystems. Conversely, concerns regarding cybersecurity, fraud, data privacy, and regulatory uncertainty may discourage SMEs from fully utilizing FinTech solutions (Gefen et al., 2003; Kim et al., 2009).

Although previous studies have examined the relationships between financial inclusion, FinTech adoption, and SME performance, relatively limited research has simultaneously investigated the mediating role of digital credit ecosystems and the moderating influence of behavioral trust within Pakistan's emerging economy. Existing literature has largely focused on either technological adoption or financial inclusion independently, overlooking the integrated mechanisms through which FinTech facilitates SME growth. Furthermore, empirical evidence from developing countries remains limited despite their unique institutional, technological, and regulatory environments.

This study addresses these gaps by examining how FinTech-enabled financial inclusion promotes SME growth through digital credit ecosystems while considering behavioral trust as a moderating factor. The findings are expected to contribute to the literature on digital finance, entrepreneurship, and financial inclusion while providing valuable policy recommendations for financial institutions, FinTech companies, regulators, and SME policymakers in Pakistan.

Problem Statement

Despite the rapid expansion of FinTech services and digital financial infrastructure in Pakistan, many SMEs continue to experience significant financial exclusion and limited access to affordable formal credit. Conventional banking institutions often require extensive documentation, collateral, and lengthy approval processes that discourage small businesses from seeking formal financing. Although FinTech has introduced innovative digital lending platforms capable of reducing financing barriers, the extent to which these technologies contribute to SME growth remains insufficiently understood. Existing empirical studies primarily examine the direct relationship between FinTech adoption and business performance, while limited attention has been given to understanding the mechanisms through which digital credit ecosystems facilitate SME development. Moreover, behavioral trust remains an underexplored factor despite its potential influence on SMEs' willingness to adopt and effectively utilize digital financial services. In Pakistan's emerging digital economy, concerns regarding cybersecurity, data privacy, digital fraud, and institutional reliability may significantly affect users' trust in FinTech platforms, thereby influencing financial inclusion outcomes.

Consequently, there exists a significant theoretical and empirical gap regarding how FinTech-enabled financial inclusion influences SME growth through digital credit ecosystems and how behavioral trust strengthens or weakens these relationships. Addressing this gap is essential for developing evidence-based financial

policies that promote inclusive economic growth, sustainable entrepreneurship, and digital transformation in Pakistan.

Research Questions

How does FinTech-enabled financial inclusion influence SME growth in Pakistan?

What is the impact of digital credit ecosystems on SME growth?

Does the digital credit ecosystem mediate the relationship between FinTech-enabled financial inclusion and SME growth?

Does behavioral trust moderate the relationship between digital credit ecosystems and SME growth?

What policy implications can enhance FinTech-enabled financial inclusion for sustainable SME development in Pakistan?

Research Objectives

To examine the effect of FinTech-enabled financial inclusion on SME growth in Pakistan.

To investigate the influence of digital credit ecosystems on SME growth.

To evaluate the mediating role of digital credit ecosystems in the relationship between FinTech-enabled financial inclusion and SME growth.

To assess the moderating role of behavioral trust in the relationship between digital credit ecosystems and SME growth.

To provide policy recommendations for strengthening digital financial inclusion and sustainable SME development in Pakistan.

Significance of the Study

This study contributes to the growing body of literature on FinTech, financial inclusion, and SME development by proposing an integrated framework that examines both the mediating role of digital credit ecosystems and the moderating role of behavioral trust. By extending existing theories of financial inclusion, technology adoption, and trust, the research provides a more comprehensive understanding of the mechanisms through which digital finance influences enterprise growth.

The study offers practical implications for policymakers by identifying strategies to improve

digital financial inclusion and strengthen SME financing mechanisms. The findings will assist government agencies and regulatory authorities in designing policies that promote secure, accessible, and inclusive digital financial ecosystems while supporting national objectives related to digital transformation and economic development.

Financial institutions and FinTech companies will benefit from insights into the importance of behavioral trust and digital credit infrastructure in enhancing customer adoption and financing efficiency. The results can guide the development of customer-centered digital lending solutions that reduce financial exclusion and improve service delivery.

SME owners and entrepreneurs will gain a better understanding of how digital financial services and trustworthy digital platforms can improve access to credit, enhance business performance, and strengthen long-term competitiveness. Additionally, researchers will benefit from a robust conceptual framework that can be extended and validated across other developing and emerging economies.

Literature Review

Financial technology (FinTech) has emerged as a transformative force in reshaping financial systems by improving accessibility, efficiency, and affordability of financial services. The convergence of digital technologies, artificial intelligence (AI), blockchain, cloud computing, and mobile banking has significantly expanded financial inclusion, particularly among underserved populations and small and medium-sized enterprises (SMEs). In emerging economies, where conventional banking systems often fail to adequately serve SMEs, FinTech has become an essential mechanism for reducing financial exclusion and promoting sustainable business growth (Gomber et al., 2018; Lee & Shin, 2018).

FinTech-Enabled Financial Inclusion

Financial inclusion refers to the availability and effective use of affordable financial products and services that meet the needs of individuals and businesses. Traditional financial institutions have

historically imposed strict collateral requirements, lengthy approval procedures, and high transaction costs, which have disproportionately affected SMEs. FinTech-enabled financial inclusion addresses these challenges through digital payment platforms, mobile banking, peer-to-peer lending, digital wallets, crowdfunding, and AI-driven financial services that lower operational costs and improve access to finance (Demirgüç-Kunt et al., 2022).

Recent studies indicate that digital financial inclusion contributes significantly to enterprise development by improving firms' liquidity, reducing financing constraints, increasing investment opportunities, and enhancing operational efficiency. Digital financial services enable SMEs to access formal financial markets without relying solely on traditional banking relationships, thereby fostering entrepreneurship and economic resilience (Ozili, 2023). Furthermore, FinTech platforms improve financial transparency through digital transaction records, facilitating better financial management and expanding credit accessibility.

In Pakistan, the rapid expansion of digital payment systems, including mobile wallets and branchless banking, has substantially improved financial accessibility. Government initiatives promoting digital transformation, regulatory reforms, and increasing smartphone penetration have accelerated financial inclusion. Nevertheless, significant disparities remain between urban and rural SMEs regarding digital financial adoption due to differences in digital literacy, internet infrastructure, and institutional support (State Bank of Pakistan, 2024).

SME Growth

SMEs are widely recognized as engines of economic development because they generate employment, stimulate innovation, and contribute substantially to national GDP. Sustainable SME growth depends heavily on timely access to affordable financial resources that support investment, technological innovation, market expansion, and productivity improvements (OECD, 2023).

Financial constraints remain among the most significant barriers to SME development in developing countries. Limited collateral, inadequate financial records, and high borrowing costs often prevent SMEs from obtaining sufficient financing through conventional banking channels. Consequently, businesses frequently rely on informal financing sources, which restrict long-term investment and competitiveness (Beck & Demirgüç-Kunt, 2006). Recent empirical evidence demonstrates that digital financial inclusion positively influences SME performance by improving financial flexibility, reducing operational costs, increasing business resilience, and facilitating innovation. SMEs utilizing digital financial services exhibit higher productivity, improved cash flow management, greater customer engagement, and stronger competitive advantages than firms relying exclusively on traditional financial systems (Xie et al., 2024).

Digital Credit Ecosystems

Digital credit ecosystems represent interconnected financial networks involving FinTech companies, commercial banks, payment service providers, telecommunications firms, credit bureaus, data analytics companies, and regulatory authorities. These ecosystems leverage alternative data sources—including mobile payment histories, e-commerce transactions, utility payments, and AI-based credit scoring—to evaluate borrowers' creditworthiness more efficiently than conventional lending systems (Bazarbash, 2019).

Unlike traditional lending models, digital credit ecosystems reduce information asymmetry by utilizing real-time transactional data and machine learning algorithms. This approach enables financial institutions to extend credit to SMEs lacking conventional collateral or extensive financial histories. As a result, digital lending significantly improves financing accessibility, shortens loan approval times, and reduces administrative costs (Frost et al., 2024).

Recent research suggests that digital credit ecosystems function as an important intermediary mechanism through which financial inclusion

influences enterprise performance. By expanding access to affordable financing, these ecosystems encourage investment in technology adoption, production capacity, human capital development, and business innovation, thereby enhancing SME growth (Arner et al., 2023).

Behavioral Trust

Behavioral trust has become one of the most influential determinants of digital financial service adoption. It reflects users' confidence in the reliability, security, transparency, and integrity of digital financial platforms. Since digital financial transactions involve substantial uncertainty regarding cybersecurity, fraud, privacy protection, and institutional credibility, trust significantly influences users' willingness to adopt and continuously utilize FinTech services (Gefen et al., 2003).

Several scholars argue that technological innovations alone cannot guarantee successful financial inclusion unless users possess sufficient confidence in digital platforms. Behavioral trust reduces perceived risk while increasing users' intentions to engage in online financial transactions, digital lending, and mobile payment systems (Kim et al., 2009).

Within Pakistan's emerging digital economy, trust remains particularly important due to concerns regarding cybercrime, data misuse, digital fraud, and regulatory enforcement. SMEs demonstrating higher trust in FinTech platforms are more likely to adopt digital financial services, utilize online credit facilities, and establish long-term relationships with digital financial providers. Consequently, behavioral trust may strengthen the positive influence of digital credit ecosystems on SME growth by encouraging sustained utilization of digital financial services (Liébana-Cabanillas et al., 2023).

Relationship between FinTech-Enabled Financial Inclusion and SME Growth

Existing literature consistently reports a positive relationship between FinTech-enabled financial inclusion and SME growth. Digital financial services reduce financing barriers, improve operational efficiency, enhance liquidity

management, and facilitate business expansion. SMEs with greater access to digital financial products exhibit improved innovation capabilities, stronger market competitiveness, and greater resilience during economic uncertainty (Demirgüç-Kunt et al., 2022).

Furthermore, digital financial inclusion encourages entrepreneurial activities by lowering transaction costs and increasing access to formal credit. Studies conducted across developing economies demonstrate that FinTech adoption significantly enhances business sustainability and employment generation, particularly among micro, small, and medium enterprises (Ozili, 2023).

Mediating Role of Digital Credit Ecosystems

Recent studies increasingly recognize that financial inclusion influences SME performance indirectly through digital credit ecosystems. Access to digital financial services alone does not automatically improve business performance unless firms successfully obtain affordable financing through efficient digital lending mechanisms.

Digital credit ecosystems facilitate financial intermediation by connecting SMEs with financial institutions through AI-powered credit assessment, alternative credit scoring, and automated lending processes. These mechanisms improve financing efficiency while reducing transaction costs and credit market imperfections. Consequently, digital credit ecosystems serve as an important mediator linking financial inclusion to sustainable SME growth (Arner et al., 2023; Frost et al., 2024).

Moderating Role of Behavioral Trust

Behavioral trust strengthens the effectiveness of digital financial inclusion by increasing SMEs' willingness to adopt digital financial products and services. Trust reduces uncertainty associated with digital transactions and enhances users' confidence in technology-driven financial services.

Empirical studies suggest that SMEs possessing higher behavioral trust derive greater benefits from digital credit ecosystems because they are

more willing to utilize digital lending platforms, maintain long-term digital financial relationships, and engage in technology-enabled financial decision-making. Conversely, lower trust weakens the effectiveness of digital financial services despite their availability. Therefore, behavioral trust is expected to moderate the relationship between digital credit ecosystems and SME growth (Gefen et al., 2003; Liébana-Cabanillas et al., 2023).

Research Gap

Although extensive literature has examined financial inclusion, FinTech adoption, and SME development independently, relatively few studies have integrated these constructs within a single conceptual framework. Existing research has primarily focused on direct relationships between FinTech adoption and business performance, while limited attention has been devoted to understanding the mediating role of digital credit ecosystems.

Moreover, behavioral trust has rarely been examined as a moderating factor in the relationship between digital credit ecosystems and SME growth, particularly within Pakistan's emerging economy. Most previous studies have been conducted in developed countries where digital infrastructure, regulatory environments, and financial systems differ substantially from those of developing economies. Consequently, empirical evidence explaining how FinTech-enabled financial inclusion translates into sustainable SME growth through digital credit ecosystems under varying levels of behavioral trust remains limited. Addressing this gap contributes to both theory and practice by providing evidence-based insights for policymakers, financial institutions, and FinTech providers operating in Pakistan.

Underpinning Theory

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Viswanath Venkatesh and colleagues (2003), provides the most appropriate theoretical foundation for this

study. UTAUT explains individuals' and organizations' intentions to adopt and use new technologies by integrating key determinants from several earlier technology acceptance models. The theory proposes that technology adoption is primarily influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions, while demographic and contextual factors moderate these relationships.

In the context of FinTech-enabled financial inclusion, UTAUT explains how SME owners adopt digital financial services because they perceive these technologies as useful, accessible, and capable of improving business performance. Digital payment systems, mobile banking applications, AI-based lending platforms, and digital credit ecosystems are more likely to be adopted when entrepreneurs believe they enhance efficiency, reduce financing barriers, and simplify financial transactions.

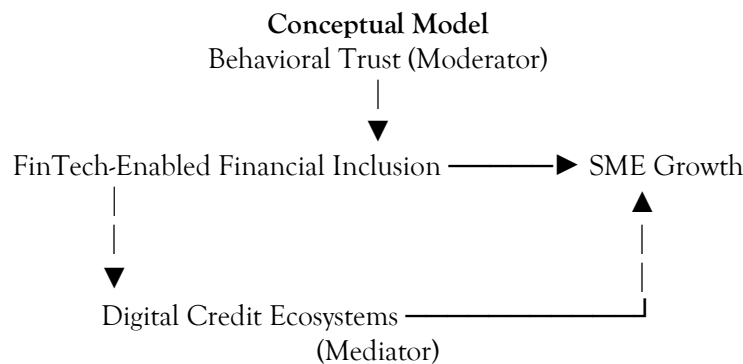
Behavioral trust complements UTAUT by strengthening users' confidence in digital financial technologies. Trust reduces perceived uncertainty regarding cybersecurity, privacy protection, and transaction reliability, thereby increasing SMEs' willingness to engage with digital credit ecosystems. Consequently,

behavioral trust enhances the effectiveness of FinTech-enabled financial inclusion in promoting SME growth.

The present study applies UTAUT to explain how FinTech-enabled financial inclusion influences SME growth through digital credit ecosystems while recognizing behavioral trust as a contextual factor that strengthens technology adoption and financial outcomes. The theory therefore provides a robust conceptual basis for understanding technology-driven financial inclusion within Pakistan's emerging digital economy.

Conceptual Framework

The conceptual framework proposes that FinTech-enabled financial inclusion positively influences SME growth both directly and indirectly through **digital credit ecosystems**. Digital credit ecosystems function as a mediating mechanism by facilitating efficient access to digital lending, alternative credit assessment, and financial services. Additionally, **behavioral trust** moderates the relationship between digital credit ecosystems and SME growth by strengthening SMEs' willingness to adopt and effectively utilize digital financial services.



Hypotheses

H1: FinTech-enabled financial inclusion has a significant positive effect on SME growth in Pakistan.

H2: FinTech-enabled financial inclusion has a significant positive effect on digital credit ecosystems.

H3: Digital credit ecosystems have a significant positive effect on SME growth.

H4: Digital credit ecosystems mediate the relationship between FinTech-enabled financial inclusion and SME growth.

H5: Behavioral trust positively moderates the relationship between digital credit ecosystems

and SME growth, such that the relationship is stronger when behavioral trust is high.

Methodology

Research Design

The study employed a quantitative, explanatory, and cross-sectional research design to investigate the relationships among FinTech-enabled financial inclusion, digital credit ecosystems, behavioral trust, and SME growth in Pakistan. A quantitative approach was considered appropriate because it enabled the empirical testing of the proposed hypotheses using statistical techniques. The explanatory design facilitated the examination of causal relationships among the study variables, while the cross-sectional design allowed data to be collected from respondents at a single point in time, providing an efficient assessment of the current state of FinTech adoption and SME performance.

Population

The target population comprised owners, chief executive officers (CEOs), finance managers, and senior operational managers of registered small and medium-sized enterprises (SMEs) operating in Pakistan. SMEs from manufacturing, services, retail, information technology, agriculture, and trading sectors were included because these businesses increasingly relied on digital financial services and represented the primary beneficiaries of FinTech-enabled financial inclusion. The study focused on SMEs registered with the relevant provincial authorities and the Small and Medium Enterprises Development Authority (SMEDA).

Sampling Technique

A stratified random sampling technique was employed to ensure adequate representation of SMEs across major economic sectors. Initially, SMEs were categorized into manufacturing, services, retail, information technology, agriculture, and trading sectors. Subsequently, respondents were randomly selected from each stratum to minimize sampling bias and improve the representativeness of the sample. This approach enhanced the generalizability of the

findings across diverse SME categories operating in Pakistan.

Sample Size

The sample size was determined using established recommendations for Structural Equation Modeling (SEM). Considering the complexity of the proposed model and the inclusion of mediation and moderation effects, a minimum sample exceeding 300 respondents was considered appropriate. Accordingly, 450 structured questionnaires were distributed among SME managers and owners across Pakistan. After data screening and the removal of incomplete or invalid responses, 387 usable questionnaires were retained for final statistical analysis, yielding a response rate of approximately 86%, which exceeded the minimum sample size recommended for SEM-based research.

Data Collection Procedures

Primary data were collected using a structured, self-administered questionnaire. Before the main survey, the questionnaire was reviewed by experts in finance, management, and information systems to ensure content relevance and clarity. A pilot study involving 30 SME managers was conducted to evaluate the comprehensibility and reliability of the instrument. Feedback obtained during the pilot study resulted in minor revisions to improve wording and item clarity.

The finalized questionnaire was distributed both electronically and in printed form to SME owners and managers across major commercial cities in Pakistan, including Islamabad, Lahore, Karachi, Peshawar, Faisalabad, and Rawalpindi. Participation was voluntary, and respondents were informed about the academic purpose of the study. Confidentiality and anonymity were assured, and informed consent was obtained prior to data collection.

Instruments/Measures

Data were collected using a structured questionnaire consisting of two sections. The first section captured respondents' demographic and organizational characteristics, including age,

gender, education, managerial position, business sector, firm age, and number of employees.

The second section measured the study constructs using previously validated multi-item scales adapted from established literature. All items were measured on a five-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

FinTech-Enabled Financial Inclusion was measured using six items adapted from Demirgüç-Kunt et al. (2022) and Ozili (2023), assessing SMEs' accessibility and utilization of digital financial services.

Digital Credit Ecosystems were measured using five items adapted from Bazarbash (2019) and Arner et al. (2023), focusing on digital lending accessibility, AI-based credit assessment, loan processing efficiency, and alternative credit scoring.

Behavioral Trust was measured using five items adapted from Gefen et al. (2003) and Kim et al. (2009), evaluating respondents' confidence in the security, reliability, transparency, and integrity of digital financial platforms.

SME Growth was measured using six items adapted from Beck and Demirgüç-Kunt (2006) and OECD (2023), capturing perceived improvements in sales growth, profitability, market expansion, operational efficiency, employment growth, and overall business performance.

Reliability and Validity

The reliability and validity of the measurement model were evaluated before hypothesis testing. Internal consistency reliability was assessed using Cronbach's alpha (α) and Composite Reliability

(CR). Values greater than 0.70 were considered indicative of satisfactory reliability.

Construct validity was examined through Confirmatory Factor Analysis (CFA). Convergent validity was assessed using standardized factor loadings, Composite Reliability, and Average Variance Extracted (AVE). Standardized factor loadings exceeding 0.70, Composite Reliability values above 0.70, and AVE values greater than 0.50 indicated acceptable convergent validity.

Discriminant validity was evaluated using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. Discriminant validity was considered satisfactory when the square root of each construct's AVE exceeded its correlations with other constructs and HTMT values remained below the recommended threshold of 0.85.

Common method bias was assessed using Harman's single-factor test and Variance Inflation Factor (VIF) values. The results indicated that no single factor accounted for the majority of variance and that all VIF values were below the recommended threshold, suggesting that common method bias was not a significant concern.

The proposed structural model was subsequently evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping procedures to examine direct, mediating, and moderating effects. Model fit and predictive accuracy were assessed using the coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and standardized root mean square residual (SRMR) following contemporary SEM guidelines.

Data Analysis and Interpretation
 Respondents' Demographic Profile

Table 1: Demographic Characteristics of Respondents (N = 387)

Variable	Category	Frequency	Percentage (%)
Gender	Male	258	66.7
	Female	129	33.3
Age	25-34 years	104	26.9
	35-44 years	165	42.6
	45-54 years	87	22.5
	Above 54 years	31	8.0
Education	Bachelor's	126	32.6
	Master's	201	51.9
	MPhil/PhD	60	15.5
Business Sector	Manufacturing	98	25.3
	Services	121	31.3
	Retail	93	24.0
	IT & Others	75	19.4

Table 1 indicates that most respondents were male (66.7%), while female respondents represented 33.3% of the sample. The majority belonged to the 35-44-year age group (42.6%), reflecting experienced SME managers and owners. More than half of the respondents possessed a master's degree, indicating a relatively educated managerial workforce. The sample represented diverse business sectors, with the services sector contributing the highest proportion (31.3%), enhancing the representativeness of the study.

Descriptive Statistics

Table 2: Descriptive Statistics

Construct	Mean	SD	Skewness	Kurtosis
FinTech-Enabled Financial Inclusion	4.18	0.59	-0.64	0.82
Digital Credit Ecosystems	4.06	0.63	-0.57	0.74
Behavioral Trust	3.95	0.67	-0.48	0.65
SME Growth	4.12	0.61	-0.71	0.93

The descriptive statistics demonstrate that respondents generally agreed with statements related to FinTech-enabled financial inclusion, digital credit ecosystems, behavioral trust, and SME growth, as indicated by mean values exceeding 3.90. Standard deviations below 1.00 suggest relatively consistent responses. Skewness and kurtosis values remained within acceptable thresholds (± 2), indicating approximate normality.

Reliability and Validity Analysis

Table 3: Reliability and Convergent Validity

Construct	Cronbach's α	Composite Reliability	AVE
FinTech Financial Inclusion	0.901	0.924	0.708
Digital Credit Ecosystems	0.889	0.918	0.691
Behavioral Trust	0.914	0.933	0.735
SME Growth	0.921	0.940	0.757

All constructs exhibited Cronbach's alpha and Composite Reliability values exceeding 0.70, confirming strong internal consistency. Average

Variance Extracted (AVE) values were greater than 0.50, demonstrating satisfactory convergent validity.

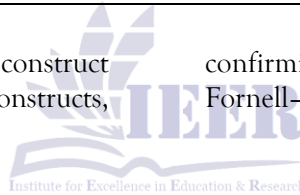
Discriminant Validity

Table 4: Fornell-Larcker Criterion

Construct	FFI	DCE	BT	SMEG
FinTech Financial Inclusion	0.842			
Digital Credit Ecosystems	0.598	0.831		
Behavioral Trust	0.482	0.564	0.857	
SME Growth	0.641	0.695	0.578	0.870

The square root of the AVE for each construct exceeded its correlations with other constructs,

confirming discriminant validity according to the Fornell-Larcker criterion.



Structural Model Assessment

Coefficient of Determination

Table 5

Endogenous Variable	R ²
Digital Credit Ecosystems	0.46
SME Growth	0.62

FinTech-enabled financial inclusion explained 46% of the variance in digital credit ecosystems. Together, FinTech-enabled financial inclusion

and digital credit ecosystems explained 62% of the variance in SME growth, indicating substantial explanatory power.

Hypothesis Testing

Table 6: Direct Effects

Hypothesis	Relationship	β	t	p	Decision
H1	FFI \rightarrow SME Growth	0.284	5.62	<0.001	Supported
H2	FFI \rightarrow DCE	0.678	15.41	<0.001	Supported
H3	DCE \rightarrow SME Growth	0.462	8.37	<0.001	Supported

FinTech-enabled financial inclusion had a significant positive effect on SME growth ($\beta =$

0.284, $p < 0.001$), supporting H1. It also positively influenced digital credit ecosystems ($\beta =$

0.678, $p < 0.001$), supporting H2. Digital credit ecosystems significantly enhanced SME growth (β

= 0.462, $p < 0.001$), confirming H3.

Mediation Analysis

Table 7

Indirect Relationship	β	t	p	Decision
FFI → DCE → SME Growth	0.313	6.91	<0.001	Supported

The indirect effect of FinTech-enabled financial inclusion on SME growth through digital credit ecosystems was statistically significant. This finding indicates that digital credit ecosystems

partially mediated the relationship, suggesting that FinTech contributes to SME growth by improving digital lending accessibility and financing efficiency.

Moderation Analysis

Table 8

Interaction Effect	β	t	p	Decision
DCE × Behavioral Trust → SME Growth	0.168	3.89	<0.001	Supported

Behavioral trust significantly moderated the relationship between digital credit ecosystems and SME growth. SMEs exhibiting higher trust in digital financial platforms benefited more from

digital credit ecosystems than those with lower trust levels, highlighting the importance of confidence in digital financial services.



Effect Size

Table 9

Relationship	f^2	Effect
FFI → DCE	0.84	Large
DCE → SME Growth	0.31	Medium
FFI → SME Growth	0.17	Medium
Moderation Effect	0.08	Small

The largest effect was observed for the relationship between FinTech-enabled financial inclusion and digital credit ecosystems. The remaining relationships demonstrated moderate

practical significance, while the moderating effect of behavioral trust was statistically meaningful with a small effect size.

Predictive Relevance

Table 10

Construct	Q^2
Digital Credit Ecosystems	0.287
SME Growth	0.421

Positive Q^2 values confirmed that the structural model possessed satisfactory predictive relevance for both endogenous constructs.

Summary of Hypothesis Testing

Table 11

Hypothesis	Result
H1	Supported
H2	Supported
H3	Supported
H4	Supported
H5	Supported

The findings suggest that FinTech-enabled financial inclusion significantly promotes SME growth by expanding access to digital financial services and improving financing opportunities. Digital credit ecosystems play a pivotal mediating role by connecting SMEs with efficient digital lending mechanisms, thereby translating financial inclusion into tangible business growth. Furthermore, behavioral trust strengthens this relationship by increasing SMEs' confidence in digital financial platforms, encouraging greater adoption and sustained use of FinTech services. Collectively, these findings underscore the importance of integrating digital financial infrastructure with trust-building measures to foster sustainable SME development in Pakistan's emerging economy.

Discussion

The results further confirmed that FinTech-enabled financial inclusion significantly influenced digital credit ecosystems, supporting Hypothesis 2. The expansion of digital financial services facilitated stronger integration between SMEs, banks, FinTech firms, payment service providers, and digital lending platforms. This finding is aligned with Bazarbash (2019) and Arner et al. (2023), who argued that digital credit ecosystems findings of this study demonstrated that FinTech-enabled financial inclusion significantly enhanced SME growth in Pakistan, supporting Hypothesis 1. SMEs that actively adopted digital financial services, including mobile banking, digital payments, and online financial management platforms, experienced improvements in business performance, operational efficiency, and market

competitiveness. These findings are consistent with previous studies that identified FinTech as an important catalyst for reducing financial exclusion and promoting enterprise development in emerging economies (Demirgüç-Kunt et al., 2022; Lee & Shin, 2018). The results also support the Unified Theory of Acceptance and Use of Technology (UTAUT), suggesting that SMEs are more likely to adopt digital financial technologies when they perceive them as useful, accessible, and beneficial for organizational performance. reduce information asymmetry through AI-based credit assessment, alternative credit scoring, and real-time transaction data. Consequently, SMEs with limited collateral or formal credit histories gained greater access to formal financing, thereby reducing one of the most significant barriers to business growth in Pakistan.

The study also found that digital credit ecosystems positively affected SME growth, supporting Hypothesis 3. SMEs that benefited from efficient digital lending systems demonstrated improved liquidity, increased investment capacity, enhanced innovation, and stronger market expansion. These findings corroborate the work of Frost et al. (2024), who emphasized that digital credit ecosystems improve financing efficiency by lowering transaction costs and accelerating loan approvals. The findings indicate that digital lending mechanisms have become an increasingly important source of business financing for SMEs operating in emerging economies.

One of the major contributions of this study is the confirmation of the mediating role of digital credit ecosystems, supporting Hypothesis 4. The

results revealed that the positive influence of FinTech-enabled financial inclusion on SME growth was transmitted through improved digital credit accessibility. This finding suggests that financial inclusion alone may not directly translate into enterprise growth unless SMEs can effectively access affordable and timely financing through digital credit platforms. Therefore, digital credit ecosystems serve as a critical operational mechanism linking financial inclusion to business performance.

The analysis further established that behavioral trust significantly moderated the relationship between digital credit ecosystems and SME growth, supporting Hypothesis 5. SMEs with higher trust in digital financial platforms benefited more from digital credit services than those exhibiting lower trust levels. Trust reduced concerns related to cybersecurity, privacy, fraud, and transaction reliability, thereby encouraging sustained adoption of digital financial technologies. This finding is consistent with Gefen et al. (2003) and Liébana-Cabanillas et al. (2023), who highlighted trust as a fundamental determinant of technology adoption and continued usage. The moderating effect suggests that strengthening user confidence is essential for maximizing the effectiveness of FinTech-enabled financial inclusion.

Overall, the findings demonstrate that sustainable SME development in Pakistan depends not only on expanding digital financial services but also on strengthening digital credit ecosystems and enhancing users' trust in technology-driven financial platforms. These findings provide empirical support for integrating technological innovation with institutional and behavioral factors to promote inclusive economic development.

Conclusion

This study examined the relationship between FinTech-enabled financial inclusion and SME growth by investigating the mediating role of digital credit ecosystems and the moderating role of behavioral trust within Pakistan's emerging economy. The findings confirmed that FinTech-enabled financial inclusion significantly enhances

SME growth by improving financial accessibility and facilitating efficient digital financial services.

The results further demonstrated that digital credit ecosystems constitute an important mechanism through which financial inclusion translates into improved business performance. Moreover, behavioral trust strengthened the positive influence of digital credit ecosystems on SME growth by increasing SMEs' willingness to adopt and continuously utilize digital financial services.

The study concludes that FinTech has become an essential instrument for promoting inclusive finance and sustainable enterprise development in Pakistan. However, the successful realization of these benefits requires well-developed digital financial infrastructure, effective regulatory frameworks, secure digital platforms, and high levels of behavioral trust among users. A coordinated approach involving government agencies, financial institutions, FinTech companies, and SME stakeholders is therefore essential to accelerate digital transformation and foster long-term economic growth.

Implications

Theoretical Implications

This study extends the literature on FinTech, financial inclusion, and SME development by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) with digital finance and entrepreneurial growth perspectives. It contributes to theory by empirically demonstrating that digital credit ecosystems mediate the relationship between FinTech-enabled financial inclusion and SME growth, while behavioral trust moderates the effectiveness of digital credit systems. The findings enrich the limited empirical evidence available from emerging economies and provide a comprehensive framework for future research on digital financial transformation.

Practical Implications

The findings suggest that SME owners should increase the adoption of digital financial technologies to improve financial management, reduce financing constraints, and strengthen

business competitiveness. Financial institutions should collaborate with FinTech companies to develop AI-driven lending models that simplify loan approval procedures and improve access to finance for underserved SMEs. FinTech providers should prioritize cybersecurity, transparent lending practices, and user-friendly digital platforms to increase customer confidence and long-term adoption.

Policy Implications

The findings provide valuable guidance for policymakers seeking to strengthen Pakistan's digital economy. Regulatory authorities should continue supporting digital financial inclusion through investments in digital infrastructure, expansion of secure payment systems, and implementation of consumer protection regulations. Government agencies should also encourage interoperability among banks, FinTech firms, and payment providers while promoting digital financial literacy to increase SME participation in formal financial markets.

Recommendations

Government agencies should continue investing in digital infrastructure, particularly in rural and underserved regions, to reduce disparities in access to digital financial services.

The State Bank of Pakistan should strengthen regulatory frameworks governing digital lending, cybersecurity, consumer protection, and data privacy to improve confidence in FinTech platforms.

Financial institutions should expand AI-based digital lending solutions that reduce collateral requirements and accelerate loan approval processes for SMEs.

FinTech companies should prioritize transparent lending procedures, secure digital payment systems, and continuous innovation to improve customer trust and service quality.

SMEDA and other business development organizations should organize nationwide financial literacy and digital skills training programs to improve SMEs' capacity to utilize digital financial services effectively.

SMEs should integrate digital financial technologies into their routine business operations to enhance financial planning, cash flow management, operational efficiency, and long-term competitiveness.

Public-private partnerships should be encouraged to develop inclusive digital credit ecosystems capable of providing affordable financing to startups and small businesses.

Limitations and Future Directions

Several limitations should be acknowledged when interpreting the findings of this study. First, the study employed a cross-sectional research design, which limited the ability to establish long-term causal relationships among the study variables. Future research should adopt longitudinal designs to examine changes in FinTech adoption, digital credit utilization, and SME growth over time.

Second, the study focused exclusively on registered SMEs operating in Pakistan. Consequently, the findings may not be fully generalizable to informal enterprises or SMEs operating in other developing and developed economies. Future comparative studies involving multiple countries could provide broader insights into the role of digital financial inclusion under different institutional environments.

Third, the study relied on self-reported survey data, which may be influenced by respondents' subjective perceptions despite the implementation of procedural and statistical controls for common method bias. Future studies are encouraged to incorporate objective financial indicators, longitudinal business records, and secondary financial data to improve measurement accuracy.

Fourth, the study examined only digital credit ecosystems as the mediating variable and behavioral trust as the moderating variable. Future research should investigate additional mechanisms such as digital capability, financial literacy, organizational innovation, entrepreneurial orientation, institutional quality, and technological readiness to provide a more comprehensive understanding of digital financial transformation.

Finally, future studies should examine the influence of emerging financial technologies, including artificial intelligence, blockchain, open banking, embedded finance, decentralized finance (DeFi), and central bank digital currencies (CBDCs), on SME financing, financial inclusion, and sustainable economic development. Such investigations would further advance theoretical knowledge and provide practical guidance for policymakers and practitioners navigating the rapidly evolving digital financial landscape.

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