

The Impact of Digital Banking and Accounting Technologies on the Financial Performance of Small and Medium Enterprises Evidence, Mechanisms, and a Hypothesis-Testing Framework

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Abstract—Digital banking and accounting technologies are increasingly reshaping the financial architecture of small and medium enterprises (SMEs). Digital payment systems, mobile and internet banking, automated collections, digital credit, cloud accounting, accounting information systems, bank feeds, e-invoicing and analytics may reduce transaction costs, improve cash-flow visibility, strengthen financial reporting and widen access to formal finance. India provides a significant setting for this inquiry because payment digitalisation has expanded rapidly, regulatory reporting is increasingly electronic, and the revised MSME framework provides enterprises greater room to scale. The Reserve Bank of India Digital Payments Index increased from 100 in March 2018 to 493.22 in March 2025, while UPI monthly volumes increased from 13.44 billion transactions in March 2024 to 18.30 billion in March 2025 and 23.20 billion in May 2026. This paper examines how digital banking and accounting technologies may influence profitability, sales growth, liquidity, working-capital efficiency and return measures of SMEs. It follows a descriptive and analytical research design based on official statistics, regulatory documents and peer-reviewed empirical studies. Five hypotheses are developed concerning the direct effect of digital banking, the direct effect of accounting technology, their complementary interaction, the mediating roles of financial-information quality and finance access, and the moderating roles of digital capability and cybersecurity readiness. A survey-ready empirical protocol is proposed for approximately 400 SMEs using reliability and validity assessment, correlation, hierarchical regression, interaction analysis, bootstrapped mediation, moderation and robustness checks. Since no original respondent dataset was supplied, the paper does not invent p-values or field

results; instead, it provides a complete hypothesis-testing framework and a preliminary evidence assessment. Existing evidence is broadly consistent with positive direct and complementary effects, but the gains depend on system integration, staff capability, data quality, governance and secure adoption.

Index Terms—Digital Banking, Accounting Technology, Cloud Accounting, Accounting Information Systems, UPI, SMEs, Financial Performance, Financial Information Quality, Access to Finance, Hypothesis Testing

I. INTRODUCTION

Small and medium enterprises contribute to production, employment, innovation and regional development, yet they frequently operate with limited managerial capacity, fragmented records, delayed receivables and restricted access to external finance. These weaknesses make the quality and speed of financial information particularly important. When an owner cannot see cash balances, overdue invoices, gross margins, tax liabilities and short-term funding needs in one reliable system, decisions are made from incomplete information and financial performance may deteriorate even when sales are growing.

Digital banking refers here to the business use of electronic payment and banking channels, including UPI and QR collections, mobile and internet banking, IMPS and NEFT transfers, digital current-account services, payment gateways, automated mandates, digital lending and transaction-linked financial services. Accounting technologies include cloud

accounting, accounting information systems, GST-enabled invoicing, e-invoicing, automated bank reconciliation, inventory-accounting integration, expense management, payroll integration, dashboards and data analytics. These technologies are analytically distinct but operationally connected: banking platforms create transaction data, while accounting systems classify, reconcile and convert that data into information for planning, control, reporting and financing.

The impact on financial performance may arise through several pathways. Faster digital collections may improve cash conversion and reduce leakage. Automated reconciliation may lower clerical cost and error. Timely financial statements may support pricing, budgeting and lender assessment. Digital credit may reduce financing frictions. However, technology expenditure, poor implementation, cyber fraud, platform dependence, weak internal controls and low employee capability may offset these benefits. Adoption alone is therefore not equivalent to effective use. The central research question is whether the combined and well-governed use of digital banking and accounting technologies creates measurable financial gains for SMEs.

II. OBJECTIVES OF THE STUDY

1. To examine the nature and extent of digital banking and accounting-technology adoption among small and medium enterprises.
2. To analyse the influence of digital banking adoption on profitability, sales growth, liquidity and working-capital efficiency.
3. To evaluate the influence of cloud accounting, accounting information systems, e-invoicing and automated reporting on financial performance.
4. To test whether integrated adoption of banking and accounting technologies creates a complementary effect greater than isolated adoption.
5. To assess whether financial-information quality and access to formal finance mediate the technology-performance relationship.
6. To examine whether digital capability, firm size, implementation quality and cybersecurity readiness moderate the relationship.
7. To propose practical recommendations for SME owners, accountants, banks, software providers and policymakers.

III. LITERATURE REVIEW

A. Digital Banking, Transaction Efficiency and SME Finance

Digital financial services may improve enterprise performance by lowering the cost and time required to receive, transfer and document money. Digital transaction trails also create data that may support credit assessment and cash-flow-based lending. The World Bank identifies digital finance as an important source of resilience and innovation for MSMEs, particularly where digital ecosystems, marketplaces and automated processes reduce information and transaction costs [6]. In India, Verma, Das and Misra analysed 9,024 MSMEs in the World Bank Enterprise Survey and found significant performance differences between digital and non-digital firms; digital financial variables were particularly associated with sales growth [8].

International evidence also supports a financing mechanism. Li et al. report that FinTech significantly improved SME performance in China by increasing financing scale and reducing financing cost, with stronger effects among smaller and higher-growth firms [11]. These findings suggest that banking technology affects performance not only through payments but also through the availability, price and timing of finance. Nevertheless, digital finance can expose firms to fraud, service interruption, opaque fees and dependence on platform-generated risk scores.

B. Accounting Technologies and Financial-Information Quality

Accounting technology can improve the completeness, accuracy, timeliness and accessibility of financial information. Cloud accounting permits remote access, automated updates, lower infrastructure requirements and closer collaboration between owners and accountants. Gyamera et al., using survey data and partial least squares structural equation modelling, found that financial accounting services and information technology were positively associated with SME financial performance [10]. Putri et al. found that cloud-accounting adoption significantly improved the quality of financial reports among 350 MSMEs, while organizational readiness and regulatory pressure were important adoption factors [12].

Cloud-based accounting is not valuable merely because it moves software online. Its performance contribution depends on whether bank feeds are reconciled, inventory and billing data are integrated, controls are configured, and managers use the resulting reports. Sastararuji et al. emphasise organizational fit and integration with other operations in their study of Thai SMEs [13]. More recent accounting research similarly treats accounting-process digitalisation as a capability that can improve performance through operational exploitation, exploration and effective accounting information systems [15], [16].

C. Complementarity, Resource-Based View and TOE Framework

The resource-based view explains performance differences through valuable and difficult-to-replicate combinations of resources and capabilities. A payment app by itself is widely available and is unlikely to create sustained advantage. A firm may obtain greater value when payment data, accounting workflows, staff knowledge, internal controls and managerial routines are integrated. Eller et al. found that SME digitalisation positively related to financial performance and mediated the effect of information-technology resources [9]. The technology-organization-environment framework adds that relative advantage, compatibility, organizational readiness, management support, regulation and stakeholder pressure jointly shape adoption and outcomes.

D. India's Digital and Regulatory Setting

India's payment infrastructure, formalisation programmes and tax systems create strong external pressure for digital adoption. The RBI Digital Payments Index records broad growth in payment enablers, infrastructure, performance and consumer centricity [1], [2]. UPI has become an important collection and payment channel for merchants and professional firms [3]. GST return systems, e-invoicing and digital records strengthen the case for integrated accounting. E-invoicing became applicable to notified taxpayers with aggregate annual turnover of ₹5 crore or more from 1 August 2023 [5]. These institutional developments may improve traceability and compliance, but they may also increase

technology and training requirements for smaller enterprises.

E. Risks, Governance and Unequal Outcomes

Positive average effects can conceal substantial differences among enterprises. A digitally mature firm with trained staff and integrated systems may convert transaction data into forecasts and working-capital decisions. Another firm may use multiple disconnected apps, duplicate entries and weak passwords, thereby increasing rather than reducing risk. Cybersecurity readiness, data backups, access controls, vendor reliability, privacy practices and staff training are therefore treated as conditions that shape the financial outcome of adoption rather than as peripheral technical concerns.

IV. RESEARCH GAP

Existing studies offer useful evidence on digital finance, cloud accounting, accounting information systems and general SME digitalisation, but important gaps remain. First, digital banking and accounting technologies are frequently studied separately even though they operate as an integrated financial-information chain. Second, many studies use perceptual performance measures without verification from financial statements, bank records or tax filings. Third, cross-sectional associations may reflect reverse causality because financially stronger firms are more able to invest in technology. Fourth, there is limited India-specific evidence on interaction effects, mediation through information quality and finance access, and heterogeneity between small and medium enterprises. Fifth, the financial costs of cyber risk, implementation failure, vendor lock-in and poor integration are not consistently included. The present study addresses these gaps by combining the two technology domains in one model and specifying a transparent hypothesis-testing and robustness framework.

V. SCOPE OF THE STUDY

Table 1: Scope of the Study

Dimension	Coverage
Geographical scope	India. The proposed primary survey is suitable for implementation across

Dimension	Coverage
	Maharashtra or a multi-state SME sample.
Enterprise scope	Small enterprises: investment not exceeding ₹25 crore and turnover not exceeding ₹100 crore; medium enterprises: investment not exceeding ₹125 crore and turnover not exceeding ₹500 crore, effective 1 April 2025.
Technology scope	Digital payments and banking, digital credit, cloud accounting, AIS, e-invoicing, bank feeds, automated reconciliation, inventory-finance integration and analytics.
Performance scope	Profitability, sales growth, return on assets/sales, liquidity, cash-conversion cycle, receivable days, cost efficiency and access to finance.
Time scope	Policy, payment and research evidence available up to July 2026.
Analytical limitation	The present paper uses secondary evidence and provides a complete empirical design. It does not report fabricated primary responses or invented statistical significance.

VI. PROBLEM STATEMENT

SMEs increasingly receive and make payments digitally, yet transaction digitisation does not automatically produce reliable accounts or better financial decisions. Payment data may remain scattered across bank accounts, gateways and mobile applications; invoices may be created separately; inventory may be recorded manually; and accountants may receive documents only after the reporting period. Consequently, an enterprise can appear digitally active while continuing to experience weak cash-flow control, delayed reconciliation, inaccurate costing and poor credit documentation. The research problem is therefore to determine whether digital banking and accounting technologies independently and jointly improve financial performance, through which mechanisms the effects

occur, and under what organizational and security conditions the benefits are realized.

VII. HYPOTHESES

H₀₁: Digital banking adoption does not significantly influence the financial performance of small and medium enterprises.

H₁₁: Digital banking adoption significantly and positively influences the financial performance of small and medium enterprises.

H₀₂: Accounting-technology adoption does not significantly influence the financial performance of small and medium enterprises.

H₁₂: Accounting-technology adoption significantly and positively influences the financial performance of small and medium enterprises.

H₀₃: The interaction between digital banking and accounting-technology adoption does not create a significant complementary effect on financial performance.

H₁₃: The interaction between digital banking and accounting-technology adoption creates a significant positive complementary effect on financial performance.

H₀₄: Financial-information quality and access to formal finance do not significantly mediate the relationship between technology adoption and financial performance.

H₁₄: Financial-information quality and access to formal finance significantly mediate the relationship between technology adoption and financial performance.

H₀₅: Digital capability and cybersecurity readiness do not significantly moderate the relationship between technology adoption and financial performance.

H₁₅: Digital capability and cybersecurity readiness significantly strengthen the positive relationship between technology adoption and financial performance.

VIII. RESEARCH DESIGN

The study adopts a descriptive and analytical design. The present paper reviews official indicators, regulatory developments and peer-reviewed empirical findings. The proposed main study will use a cross-sectional organizational survey supplemented, where permission is granted, by objective financial

records for the latest three financial years. The unit of analysis is the enterprise, while the preferred respondent is the owner, finance head, chief accountant or senior manager with direct knowledge of technology use and financial performance.

For a large population, Cochran's formula at a 95 per cent confidence level, a 5 per cent margin of error and maximum variability gives a minimum sample of approximately 384 enterprises. A target of 420-450 responses is recommended to allow for incomplete questionnaires and subgroup analysis, with at least 400 valid cases. Stratification should be applied by enterprise size, sector and region. Manufacturing, trade and services should all be represented, and very recently established firms should be distinguished from mature enterprises.

The core analysis will estimate the effects of digital banking adoption and accounting-technology adoption after controlling for enterprise age, size, sector, leverage, ownership form, export status, market conditions and prior profitability. The design should distinguish adoption intensity from adoption quality. A firm using UPI only for occasional receipts is not equivalent to a firm that integrates collections, bank reconciliation, receivables, inventory, taxation and cash-flow forecasting.

Table 2: Independent, Mediating, Moderating and Dependent Variables

Hypotheses	Independent / Explanatory Variable	Mediator / Moderator	Dependent Variable
H1	Digital banking adoption intensity	—	Financial performance
H2	Accounting-technology adoption intensity	—	Financial performance
H3	Digital banking × accounting technology	System integration quality	Financial performance
H4	Combined technology	Financial-information	Financial performance

Hypotheses	Independent / Explanatory Variable	Mediator / Moderator	Dependent Variable
	adoption	quality; access to formal finance	e
H5	Combined technology adoption	Digital capability; cybersecurity readiness	Financial performance

IX. OPERATIONALISATION OF VARIABLES

Table 3: Operationalisation of Key Variables

Variable	Dimensions	Illustrative Indicators	Scale / Source
Digital banking adoption	Payments, collections, transfers, digital credit, mandates	Share of receipts/payments digital; frequency of mobile/internet banking; QR/UPI use; digital loan applications; automated collection use	Index from Likert items and transaction ratios
Accounting technology	Cloud accounting, AIS, e-invoicing, automation, analytics	Real-time ledger; bank feeds; automated reconciliation; GST/e-invoice integration; inventory linkage; dashboard use	Adoption-intensity index
Financial-information quality	Accuracy, timeliness, completeness,	Closing delay; reconciliation differences;	Likert and verified process measures

Variable	Dimensions	Illustrative Indicators	Scale / Source
	relevance	error frequency; reporting frequency; forecast availability	
Access to finance	Availability, amount, cost and speed	Credit approval, interest cost, sanctioned limit, turnaround time, collateral intensity	Ratio, ordinal and nominal measures
Financial performance	Profitability, growth, liquidity and efficiency	ROA, ROS, operating margin, sales growth, current ratio, receivable days, cash-conversion cycle	Financial statements and perceptual scale
Digital capability	Skills, management support, integration and use	Training, dedicated responsibility, process redesign, report use, system compatibility	Likert composite
Cybersecurity readiness	Controls, backups, access and incident response	MFA, role-based access, backups, vendor review, fraud awareness, incident plan	Readiness index
Controls	Firm and market characteristics	Size, age, sector, leverage, ownership, export status,	Administrative and financial data

Variable	Dimensions	Illustrative Indicators	Scale / Source
		region and prior performance	

X. DATA SOURCES

A. Primary Data Proposed for the Main Study

- A structured questionnaire administered to SME owners, finance heads, chief accountants or senior managers.
- Financial statements for the latest three years, including profit-and-loss account, balance sheet and cash-flow information, where consent is available.
- Bank and payment summaries showing digital collection and payment shares without collecting sensitive credentials.
- System-use evidence such as accounting-software modules, reconciliation frequency, e-invoice use and management-reporting frequency.
- Semi-structured interviews with chartered accountants, bankers, software providers and SME associations to interpret implementation barriers.

B. Secondary Data Used in this Paper

- Reserve Bank of India publications on digital payments, payment indicators, banking technology and financial inclusion.
- National Payments Corporation of India statistics on UPI transaction volumes and participating banks.
- Ministry of MSME and Press Information Bureau information on classification, registration, formalisation and sector contribution.
- GST and CBIC notifications and portal guidance on electronic invoicing and digital return preparation.
- World Bank reports and Enterprise Survey research on MSME digital finance and performance.
- Peer-reviewed literature on FinTech, cloud accounting, accounting information systems, digitalization and SME performance.

XI. DATA COLLECTION INSTRUMENTS AND PROCEDURES

A. Structured Questionnaire

- Enterprise profile: year of establishment, legal form, sector, employment, turnover band, investment band, ownership and location.

- Digital banking profile: channels used, digital share of receipts and payments, collection methods, payment automation, digital credit and perceived reliability.
- Accounting-technology profile: software type, modules, cloud use, e-invoice integration, bank feeds, inventory integration, closing time and dashboard use.
- Information quality: accuracy, timeliness, completeness, reconciliation quality, reporting frequency and forecast availability.
- Financial outcomes: revenue growth, margin change, liquidity, receivable days, operating cost, financing cost and perceived overall performance.
- Capability and governance: training, implementation support, access controls, backups, cybersecurity incidents, vendor support and management commitment.

B. Measurement and Validation

Multi-item constructs should use five- or seven-point Likert scales. Content validity should be assessed by at least three academic and professional experts. A pilot test of 30-50 SMEs should examine wording, completion time and reliability. Items with weak corrected item-total correlations or cross-loadings should be revised or removed. Objective measures should be preferred where available, while perceptual performance scales should compare the enterprise with its main competitors and with its own prior three-year trend.

C. Ethical and Data-Protection Procedures

Participation should be voluntary and based on informed consent. No passwords, UPI PINs, account credentials or personally identifiable customer data should be collected. Financial information should be coded, stored securely and reported only in aggregated form. The instrument should explain the research purpose, withdrawal rights, confidentiality arrangements and contact details of the researchers.

XII. DIGITAL BANKING AND ACCOUNTING-TECHNOLOGY TRENDS

A. Expansion of Digital Payments

The RBI Digital Payments Index was created with March 2018 as the base period of 100. The index reached 445.50 in March 2024, 465.33 in September

2024 and 493.22 in March 2025 [1], [2]. This pattern reflects the broad expansion of payment enablers, infrastructure and performance. For SMEs, the relevance lies not only in consumer convenience but in the availability of faster receipts, lower cash handling, transaction records and platform-based financial services.



Figure 1: Growth of the RBI Digital Payments Index
Source: Reserve Bank of India, RBI-DPI press releases.
March 2018 = 100.

B. UPI Scale and SME Relevance

UPI monthly volume increased from 13.44 billion transactions in March 2024 to 18.30 billion in March 2025. NPCI reported 23.20 billion transactions in May 2026 [3]. For SMEs, such scale makes digital collections a mainstream operating capability. The direct effect on performance depends on merchant acceptance cost, settlement reliability, reconciliation and whether payment data is linked to customer accounts and sales records.

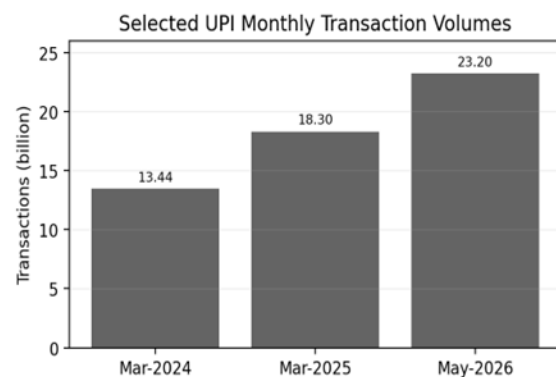


Figure 2: Selected UPI Monthly Transaction Volumes

Sources: NPCI statistics; March 2024 and March 2025 public NPCI summaries; May 2026 NPCI product statistics.

C. Accounting Digitalisation and E-Invoicing

Digital banking generates transaction data, but accounting technology determines whether that data becomes usable information. Bank feeds and automated reconciliation reduce manual matching; e-invoicing standardises invoice reporting; integrated inventory and accounting support margin measurement; and dashboards shorten the delay between economic events and management decisions. The Indian e-invoicing threshold of ₹5 crore captures a meaningful group of small and medium enterprises and increases the importance of compatible accounting systems [5].

D. Formalisation and the Revised SME Framework

The revised Indian classification effective 1 April 2025 defines a small enterprise as one with investment not exceeding ₹25 crore and turnover not exceeding ₹100 crore, and a medium enterprise as one with investment not exceeding ₹125 crore and turnover not exceeding ₹500 crore [4]. The wider limits allow enterprises to scale while remaining within the MSME policy framework. Formal registration, electronic tax compliance and digital transaction histories can improve visibility to banks and supply-chain partners, although formalisation also increases reporting and control requirements.

Table 4: Technology Capabilities and Expected Financial Pathways

Technology Capability	Immediate Operational Effect	Expected Financial-Performance Pathway
UPI / QR and payment gateways	Faster collection and lower cash handling	Lower receivable days, reduced leakage and improved liquidity
Mobile and internet banking	Real-time balance visibility and rapid transfers	Better treasury control and fewer idle or overdraft balances
Digital credit and cash-flow underwriting	Faster application and data-based assessment	Greater funding access and potentially lower financing friction
Cloud	Centralised,	Timely decisions,

Technology Capability	Immediate Operational Effect	Expected Financial-Performance Pathway
accounting and AIS	accessible and regularly updated records	lower processing cost and improved control
Automated bank reconciliation	Rapid matching of bank and ledger transactions	Lower error, fraud detection and faster closing
E-invoicing and GST integration	Standardised invoice and tax reporting	Compliance efficiency and stronger documentation
Inventory-accounting integration	Real-time cost, stock and margin information	Improved pricing, purchasing and working-capital management
Analytics and dashboards	Forecasting and exception reporting	Improved budgeting, resource allocation and profitability management

XIII. MECHANISMS LINKING TECHNOLOGY TO FINANCIAL PERFORMANCE

A. Revenue Collection and Cash Conversion

Digital payment acceptance reduces customer friction and can accelerate receipt. Automated reminders, payment links and mandates may improve collection discipline. The financial gain is captured through lower receivable days, a shorter cash-conversion cycle and reduced bad-debt exposure. The gain is strongest when the payment is automatically allocated to the correct customer and invoice.

B. Cost Efficiency and Process Automation

Manual data entry, duplicate record keeping, physical document movement and repeated reconciliation consume scarce SME staff time. Automation can reduce these costs, but subscription fees, implementation effort, customisation and training must be included in the net-benefit calculation. A cost reduction that is offset by software under-utilisation will not improve financial performance.

C. Information Quality and Management Control

Accurate and timely accounting information helps managers evaluate product margins, customer profitability, expense trends, tax liabilities and cash needs. Better information may reduce pricing mistakes, stock-outs, over-purchasing and delayed corrective action. This mechanism supports Hypothesis 4, in which information quality mediates the adoption-performance relationship.

D. Access to Finance

Banks and digital lenders can assess an enterprise more effectively when transaction and accounting records are consistent, timely and verifiable. Financial statements, GST records, receivable histories and bank flows may reduce information

asymmetry. Formal finance can then support inventory, equipment and expansion. However, the direction of causality must be tested because stronger firms may both digitalise earlier and obtain credit more easily.

E. Compliance, Transparency and Stakeholder Trust

Electronic invoicing, audit trails, access controls and regular reporting may improve compliance readiness and the confidence of lenders, investors, large customers and auditors. At the same time, excessive dependence on a single vendor or weak data governance can create operational and legal risk. Transparency must therefore be accompanied by control over access, accuracy and retention.

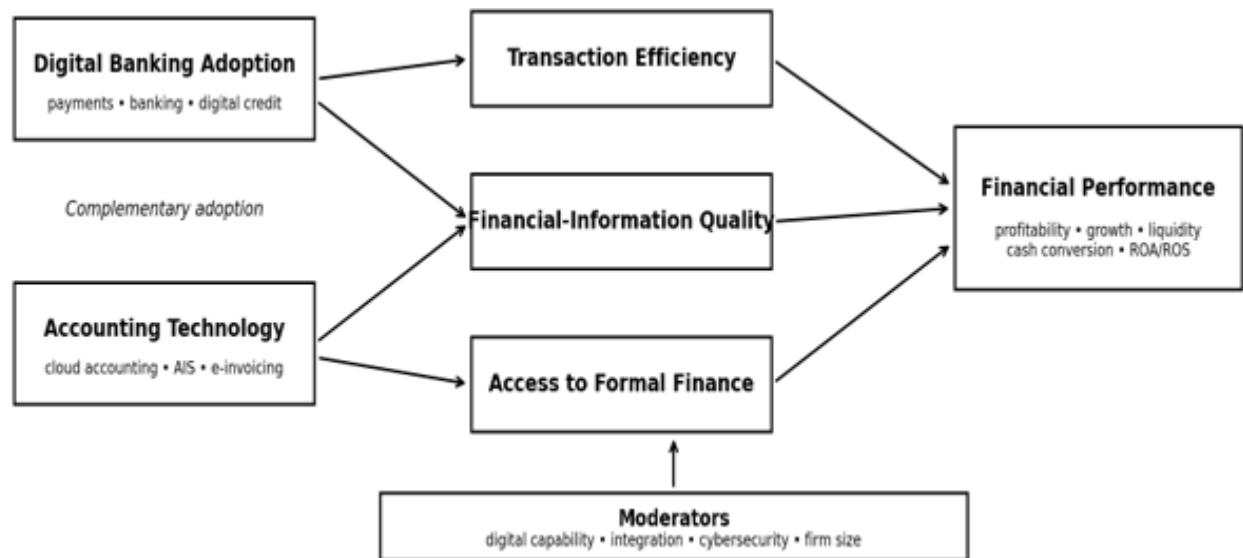


Figure 3: Proposed Conceptual Model

Source: Authors' conceptualisation based on the resource-based view, TOE framework and reviewed empirical literature.

XIV. MAJOR CHALLENGES AND RISK FACTORS

A. Fragmented Systems and Weak Integration

Many SMEs use separate applications for payments, billing, inventory, payroll and taxation. Data may be exported and re-entered, creating delay and inconsistency. Integration quality is therefore a central explanatory variable rather than a technical detail.

B. Skills, Change Management and Under-Utilisation

Software may be purchased for compliance while management reports remain unused. Owners and employees require basic accounting knowledge, process discipline and the ability to interpret dashboards. Training should cover both system operation and financial decision-making.

C. Cybersecurity and Fraud

Phishing, credential theft, unauthorised transfers, invoice manipulation and malware can directly reduce financial performance. Multi-factor

authentication, role-based access, maker-checker controls, backups and incident procedures are necessary. Cybersecurity readiness is therefore expected to strengthen the benefits of adoption and reduce downside risk.

D. Cost, Vendor Dependence and Data Portability

Subscription charges may rise as transaction volume, users or modules increase. Proprietary formats can make switching difficult. Contracts should address service levels, backups, data ownership, export rights, support and exit arrangements. A low initial price is not sufficient if the total cost of ownership becomes uncertain.

E. Data Quality and Informal Business Practices

Automation reproduces the quality of source data. Unrecorded transactions, personal-business mixing, incorrect masters and delayed invoice entry weaken reports even in advanced systems. Effective digitalisation therefore requires process formalisation, chart-of-account design and periodic review by competent accounting personnel.

Table 5: Major Risks, Financial Consequences and Controls

Risk	Possible Financial Consequence	Recommended Control
Cyber fraud and credential compromise	Direct loss, payment interruption and reputational cost	MFA, role-based access, maker-checker approval, alerts and staff awareness
Poor integration and duplicate entry	Errors, delayed closing and unreliable margins	API/bank-feed integration, reconciliation rules and master-data governance
Vendor outage or lock-in	Operational disruption and switching cost	Service-level terms, backups, export rights and tested contingency procedures
Low employee capability	Under-utilisation and wrong interpretation	Role-based training, documented

Risk	Possible Financial Consequence	Recommended Control
		workflows and management review
Weak data quality	Incorrect tax, costing, credit and performance decisions	Periodic reconciliation, validation controls and professional accounting review
Excessive automation without oversight	Unnoticed exceptions or control override	Exception reports, approval thresholds and audit trails
Digital exclusion or unreliable connectivity	Interrupted collections and incomplete records	Multiple channels, offline contingency and phased implementation

XV. HYPOTHESIS-TESTING METHODOLOGY

A. Data Screening and Descriptive Analysis

The dataset should be examined for missing values, straight-line responses, duplicate cases, implausible ratios and influential outliers. Continuous financial variables may be winsorised at the 1st and 99th percentiles where justified. Means, medians, standard deviations, sector distributions and adoption frequencies should be reported. Small and medium enterprises should be compared before estimating the multivariate model.

B. Reliability and Construct Validity

Internal consistency should be assessed using Cronbach's alpha and composite reliability, with values of 0.70 or above normally considered acceptable. Exploratory factor analysis may be followed by confirmatory factor analysis or PLS measurement assessment. Convergent validity can be examined through average variance extracted above 0.50, while discriminant validity can be assessed through the Fornell-Larcker criterion and HTMT ratios. Items should not be retained solely to improve numerical thresholds if content validity is weakened.

C. Regression Models for Direct and Interaction Effects

The baseline model is: $FP_i = \beta_0 + \beta_1 DB_i + \beta_2 AT_i + \sum \beta_k Control_{ki} + \varepsilon_i$, where FP is financial performance, DB is digital-banking adoption and AT is accounting-technology adoption. H1 is supported when β_1 is positive and statistically significant; H2 is supported when β_2 is positive and significant. The complementarity model adds the mean-centred interaction term $DB \times AT$. H3 is supported when the interaction coefficient is positive, significant and economically meaningful. Simple-slope analysis should illustrate the effect of digital banking at low and high levels of accounting-technology adoption.

D. Mediation and Moderation Tests

H4 should be tested through bootstrapped indirect effects. Separate mediation paths are proposed for financial-information quality and access to formal finance. A significant indirect effect with a confidence interval excluding zero supports mediation, while the direct effect indicates partial or

full mediation. H5 should be tested through interaction terms between combined technology adoption and digital capability, and between adoption and cybersecurity readiness. Conditional-effect plots should be reported rather than relying only on coefficient signs.

E. Robustness and Endogeneity

Variance inflation factors should assess multicollinearity. Heteroskedasticity-robust standard errors should be used. Alternative performance measures such as ROA, operating margin, sales growth and cash-conversion cycle should be estimated separately. Propensity-score matching or entropy balancing can compare digitally advanced and less advanced firms with similar characteristics. Lagged technology measures, instrumental variables or panel data should be considered in future work to reduce reverse-causality concerns. Harman's single-factor test alone is insufficient for common-method bias; procedural separation and marker-variable approaches are preferable.

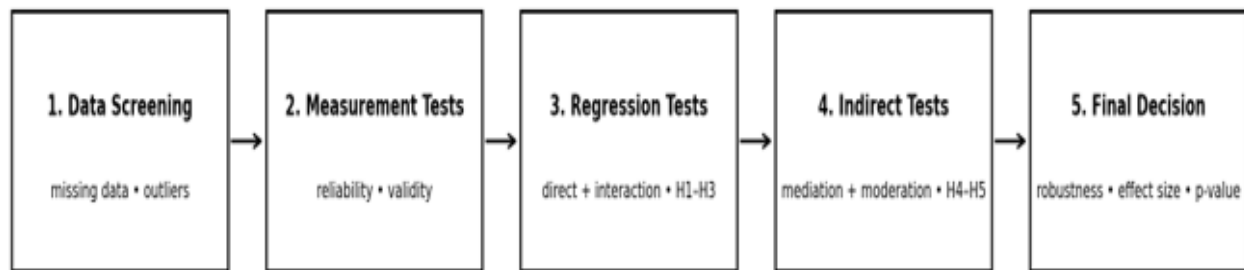


Figure 4: Hypothesis-Testing and Decision Workflow

Source: Authors proposed empirical procedure.

Table 6: Proposed Statistical Tests and Decision Criteria

Hypothesis	Primary Test	Required Evidence	Decision Rule
H1: Digital banking → performance	Hierarchical multiple regression	DB coefficient after controls; objective and perceptual performance	Reject H_{01} if $\beta_1 > 0$ and $p < 0.05$, with meaningful effect size

Hypothesis	Primary Test	Required Evidence	Decision Rule
H2: Accounting technology → performance	Hierarchical multiple regression / SEM	AT coefficient after controls; reporting and performance indicators	Reject H_{02} if $\beta_2 > 0$ and $p < 0.05$
H3: Complementarity	Interaction regression	$DB \times AT$ term and conditional	Reject H_{03} if interaction > 0 , $p < 0.05$

Hypothesis	Primary Test	Required Evidence	Decision Rule
	and simple slopes	1 effects	and slopes show complementarity
H4: Mediation	Bootstrapped indirect effects / SEM	Information quality and finance-access paths	Reject H ₀₄ if indirect-effect confidence interval excludes zero
H5: Moderation	Interaction terms and conditional-effect plots	Digital capability and cybersecurity-readiness interactions	Reject H ₀₅ if moderation coefficient is significant and direction is consistent

XVI. HYPOTHESIS-WISE ANALYTICAL ASSESSMENT

A. Hypothesis 1: Digital Banking and Financial Performance

The India-specific enterprise evidence is consistent with a positive relationship, particularly for sales growth [8]. Digital finance can reduce collection friction and create transaction information for credit assessment. However, employment growth and labour productivity effects may be weaker, and the benefit may differ by enterprise age, size and formal status. H1 is therefore empirically plausible but requires testing with the proposed SME sample and financial controls.

B. Hypothesis 2: Accounting Technology and Financial Performance

Studies of financial accounting services, cloud accounting and accounting information systems generally report positive links with financial-report quality or performance [10], [12], [15]. The expected effect is stronger when systems improve closing speed, reconciliation, costing and managerial use. Mere possession of software is an inadequate

adoption measure. H2 should be tested using intensity, integration and actual reporting outcomes.

C. Hypothesis 3: Complementary Effect

The strongest theoretical argument concerns complementarity. Digital banking creates timely transaction data, while accounting technology classifies and interprets it. When the two are integrated, benefits may be multiplicative rather than additive. Gyamera et al. found an important role for information technology in the accounting service-performance relationship [10], while the resource-based view suggests advantage from combined capabilities. Direct evidence on this specific interaction remains limited, making H3 a major contribution of the proposed study.

D. Hypothesis 4: Mediation

Financial-information quality is a credible mediator because improved data quality connects technology use with pricing, budgeting, liquidity management and credit documentation. Access to finance is a second pathway supported by FinTech research showing financing-scale and financing-cost mechanisms [11]. The mediation model should allow both pathways to operate simultaneously and should test whether their relative importance differs between small and medium enterprises.

E. Hypothesis 5: Moderation

Digital capability determines whether technology is configured, integrated and used for decisions, while cybersecurity readiness protects the expected gains. Evidence that organizational readiness influences cloud-accounting adoption supports this logic [12], [13]. Nevertheless, stronger controls can also impose cost, and very small firms may use simpler but adequate systems. H5 should therefore examine both statistical interaction and the economic magnitude of conditional effects.

Table 7: Preliminary Evidence Assessment Without Fabricated Primary Results

Hypothesis	Secondary-Evidence Position	Current Status
H1	Indian WBES evidence and digital-finance literature indicate	Plausible; formal accept/reject

Hypothesis	Secondary-Evidence Position	Current Status
	positive association, especially with sales growth.	decision requires the proposed sample.
H2	Accounting-service, cloud-accounting and AIS studies generally indicate improved report quality and performance.	Plausible; must distinguish effective use from software ownership.
H3	Strong conceptual and operational logic for complementarity; limited direct India-specific interaction evidence.	Open empirical contribution; requires interaction testing.
H4	Literature supports information-quality and financing-cost/access mechanisms.	Plausible; requires bootstrapped indirect-effect testing.
H5	Organizational readiness and capability are repeatedly important; cybersecurity effect is context-dependent.	Requires conditional-effect testing and subgroup analysis.

XVII. FINDINGS FROM THE SECONDARY-DATA ANALYSIS

1. India's payment ecosystem has deepened substantially, creating a broad infrastructure for SME digital transactions and collections.
2. UPI transaction growth indicates that digital payment acceptance is no longer a niche capability, but transaction scale alone does not prove enterprise profitability.
3. Indian enterprise evidence associates digital financial adoption with stronger sales growth, although effects differ across performance indicators and firm characteristics.

4. Accounting technologies are most likely to improve performance through accurate, timely and integrated information rather than through software ownership alone.

5. Digital banking and accounting technology are operational complements because banking creates transaction data and accounting systems transform it into control and decision information.

6. Financial-information quality and access to finance are the most defensible mediating mechanisms identified in the reviewed literature.

7. Digital skills, organizational readiness, integration quality and cybersecurity determine whether adoption produces benefit or additional risk.

8. The existing evidence supports the direction of the proposed hypotheses, but primary-data testing is necessary before formal statistical acceptance or rejection.

XVIII. RECOMMENDATIONS

A. Integrate Collections with the Ledger

SMEs should connect payment channels, customer invoices and bank reconciliation so that receipts are allocated automatically and exceptions are reviewed promptly. Payment adoption without ledger integration should be treated as an incomplete stage of digitalization.

B. Adopt a Phased Technology Architecture

Implementation should begin with reliable invoicing, banking, reconciliation and reporting before adding complex analytics. Selection should be based on process fit, total cost, data portability, controls and support rather than on the number of features.

C. Strengthen Financial and Digital Capability

Training should combine software operation with cash-flow management, costing, working capital, internal control and interpretation of reports. Accountants should move beyond compliance support toward regular management review and advisory services.

D. Build Cybersecurity into Financial Processes

Multi-factor authentication, role separation, maker-checker approval, payment alerts, backup testing and incident response should be standard. Vendor access and employee exit procedures should be documented.

Cybersecurity expenditure should be viewed as protection of cash flow and business continuity.

E. Use Digital Records to Improve Credit Readiness
SMEs should maintain consistent financial statements, tax records, receivable ageing and cash-flow forecasts. Banks should allow secure and consent-based use of transaction and accounting data while maintaining transparent credit decisions and grievance processes.

F. Support Interoperability and Affordable Adoption
Software providers and policymakers should encourage standard data export, APIs, bank-feed access, multilingual training and affordable entry-level plans. Programmes should measure effective use and performance outcomes rather than counting registrations or software installations alone.

G. Establish Periodic Digital-Finance Reviews
Management should review collection cost, reconciliation exceptions, receivable days, system uptime, user access, software cost and fraud incidents each quarter. A technology that does not improve these indicators should be redesigned, renegotiated or replaced.

XIX. LIMITATIONS OF THE STUDY

- The paper relies on secondary evidence and does not report an original SME survey or audited firm-level dataset.
- Digital adoption and financial performance may influence each other, creating reverse-causality and selection concerns.
- Technology definitions and platform features change rapidly, so instruments require updating before field administration.
- Self-reported performance and adoption measures may be affected by recall, optimism and common-method bias.
- Sector, enterprise size, region and business model can produce heterogeneous effects that a single average coefficient may conceal.
- Cyber losses and implementation failures may be under-reported because firms consider such information sensitive.

XX. CONCLUSION

Digital banking and accounting technologies can reshape the financial management of small and medium enterprises by accelerating transactions, improving information quality, strengthening working-capital control and supporting access to formal finance. The reviewed Indian and international evidence is broadly consistent with a positive relationship between digitalisation and SME performance. Nevertheless, the financial effect does not arise automatically from adopting a payment application or purchasing accounting software. Value is created when banking data, accounting processes, internal controls, employee capability and managerial decisions are integrated.

The proposed framework therefore treats digital banking and accounting technology as complementary capabilities. It tests direct effects, interaction, mediation through information quality and finance access, and moderation through digital capability and cybersecurity readiness. This approach is more informative than a simple adopter-versus-non-adopter comparison because it explains why similar technologies produce different outcomes across enterprises.

A full empirical study should collect approximately 400 valid enterprise responses and, wherever possible, verify performance through financial records. Formal conclusions should be based on transparent reliability, validity, regression, mediation, moderation and robustness procedures. Until such data are collected, the evidence supports a cautious conclusion: integrated and secure digital financial management is likely to improve SME financial performance, but fragmented, poorly governed or under-utilised adoption may produce limited benefit or additional risk.

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