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Research paper

The Impact of FinTech Adoption on SME Performance: The Mediating Roles of Financial Literacy and Transparency

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Abstract

The rapid adoption of financial technologies (FinTech) has transformed the way Small-Medium Enterprises (SMEs) manage operations, finances, and stakeholder relationships. However, the mechanisms through which FinTech improves SMEs' performance remain underexplored. This study investigates the impact of fintech adoption on SMEs' performance, with financial literacy and transparency examined as mediating variables. Using data collected from 300 SMEs in India and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM), the findings reveal that FinTech adoption has a significant positive effect on SMEs' performance. Moreover, financial literacy and transparency partially mediate this relationship, underscoring their role as complementary enablers. The model explains substantial variance in SMEs' performance, confirming its predictive strength. The study contributes to theoretical literature by combining Fintech adoption, transparency, and financial literacy into a unified performance model by expanding the previous research on the Technology Acceptance Model (TAM) and SMEs' digital adoption. Practically, the findings offer SMEs, policy makers, and financial institutions insight into how to make use of digital tools and strengthen the governance and literacy frameworks. This novel integration, when tested in the Indian context, provides a rich contribution to global discourse on SMEs' competitiveness in the digital economy.

Keywords: *Fintech; SMEs Performance; Financial Literacy; Transparency; Financial Technology.*

1. Introduction

Small and Medium Enterprises (SMEs) are the backbone of economic growth, innovation, and providing employment to people worldwide. Worldwide, SMEs make up around 90% of businesses and almost half of all employment (World Bank, 2022). In India, the Micro, Small, and Medium Enterprise (MSME) sector contributes nearly 30% of the GDP and employs more than 110 million people, thereby playing a vital role in sustaining the process of inclusive growth (Ministry of MSME, 2023). Yet, despite this importance, SMEs are still faced with certain challenges, which include poor access to finance, poor resource management, and scalability in competitive markets. These obstacles make it hard for SMEs to reach their economic potential.

The surge of Financial Technology (Fintech) has been identified as a potential solution to these barriers. FinTech innovations such as digital payments, peer-to-peer lending, crowdfunding platforms, and alternative credit scoring systems are redefining the way SMEs interact with the financial markets. They promise faster, cheaper, and inclusive services compared to traditional banking (AFI, 2022). There is evidence that supports these benefits: a survey on the business growth of Indian MSMEs in 2024 found that 73% experienced growth as a result of digital adoption, mainly facilitated by smartphones and UPI transactions (Economic Times, 2024). Studies from Indonesia, China, and Europe suggest in a similar way that FinTech adoption is linked to better revenue, cash flow stability, operational efficiency, and innovation capability (Budiyanto and Sitohang, 2022; Wang et al., 2024; Bešić et al., 2025).

However, the FinTech adoption in the SMEs performance pathway isn't entirely straightforward. Research helps shed light on the existence of mediating mechanisms that explain the digital tools-to-tangible business outcome. One such mediator is transparency. FinTech applications inherently establish transparency with the generation of trails of auditable transactions, asymmetric information is reduced, and accountability is heightened in financial operations (Jamaludin et al., 2025). Greater transparency helps SMEs to increase their credibility among lenders and investors, reduce the risks of frauds and also secure better financial terms, which indirectly enhances their performance (Rehman et al., 2025).

Together, transparency and financial literacy are important links between FinTech adoption and SMEs' success. FinTech gives the infrastructure of technology, transparency gives accountability, and financial literacy can give meaningful interpretation and use of financial

information. When these mediators are activated, SMEs are more likely to have seen improvements in operational performance (efficiency, productivity) as well as financial performance (profitability, access to credit, sustainability).
Therefore, the purpose of this study is to (i) find out the direct relationship between FinTech adoption and SMEs performance and (ii) to find out the mediating role of transparency and financial literacy in the relationship. By taking these views into account, the research not only contributes to the theoretical debates in the field of digital finance and SMEs literature but also continues to offer practical insights for policymakers and regulators (and entrepreneurs) who are interested in designing inclusive digital ecosystems for the growth of SMEs.

1.1. Global perspectives on fintech and sme empowerment

The impact of fintech on underserved SMEs varies from region to region and economy to economy. In developed economies, the adoption of fintech could lead to an increase in efficiency and lowering of transaction costs for SMEs, whereas in developing economies, it could help close gaps in the financial infrastructure and create avenues for growth (Ruhmann et al., 2020) but the cultural, regulatory and economic environment of each country will determine how empowering fintech is to SMEs is different in each region and economy. In developed economies, adoption of fintech could lead to an increase in efficiency and lowering of transaction costs for SMEs, whereas in developing economies, it could help close gaps in the financial infrastructure and create avenues for growth (Ruhmann et al., 2020), but the cultural, regulatory, and economic environment of each country will determine how empowering fintech is to SMEs. However, the performance of small and medium enterprises (SMEs) is very important to the economy and society as a whole (Kim & Shim, 2018; Shuaib & He, 2021). As a result, it has been the focus of significant scholarly research (Halabí & Lussier, 2014). Academic research has concentrated on business performance, as supported by(Andrews et al., 2017). According to the evidence, fintech is not a service provided by banks but rather an innovative business model that greatly benefits society; as a result, it dramatically raises the performance of SMEs (Kuo & Ernie, 2015; Sula & Angraini, 2022)Additionally, just as traditional banking does, fintech allows financial transactions without requiring an account. Similar to how the SME sector is given long-term potential clients, fintech innovation increases their performance and sustainability. (Lu, 2018). Fintech-based business strategies have been impacted, especially by SMEs, by the rapidity of technology development globally. (Herdinata & Pranatasari, 2022).

1.2. Fintech and financial inclusion

The role of FinTech in advancing financial inclusion has attracted a huge amount of scholarly and policy attention. The use of innovations like mobile banking, digital lending platforms, and financial payment systems by FinTech has the potential to mitigate and save transaction costs and reduce information asymmetry in transactions, thus opening up access to credit and financial services to SMEs traditionally excluded from formal financial services (Demirguc-Kunt & Klapper, 2013; Ozili, 2018). Financial inclusion is the process of providing affordable, accessible, and suitable financial services to underserved or excluded groups, including SMEs. It is widely recognised as a driver of economic growth, poverty reduction, and sustainable development (World Bank, 2018; Sahay et al., 2020). SMEs, even though they are extremely relevant to local and national economies, often struggle with a variety of challenges, including a lack of collateral, poor credit histories, and poor banking infrastructure, which make accessing finance difficult (Demirguc-Kunt and Klapper, 2013; Beck and Rojas-Suarez, 2020).
Recent research underscores the positive impact that FinTech solutions-coverage of AI-enabled credit scoring to blockchain-based transaction systems-are having on creating new models of inclusion by delivering more transparent, efficient, and tailored financial products (Gomber et al., 2022; Alibhai et al., 2023). Furthermore, digital ecosystems have become increasingly acknowledged as a necessity when it comes to enhancing financial resilience and participation among SMEs, particularly in emerging markets (UNCTAD, 2022; Arner et al., 2023).

2. Literature Review and Proposed Hypotheses

2.1. Financial technology adoption

Financial Technology (FinTech) has profoundly reshaped the financial services industry, redefining how individuals and businesses access, manage, and utilize financial resources. Its exponential growth in the past decade is well explained through the Technology Acceptance Model (TAM), which identifies perceived usefulness (PU), perceived ease of use (PEOU), trust, and security as critical determinants of adoption (Davis, 1989; Thathsarani & Jianguo, 2022; Wang, 2021). In the FinTech context, TAM has been expanded to capture additional behavioral and contextual variables such as digital literacy, innovation readiness, and regulatory trust that increasingly influence adoption, especially in small and medium-sized enterprises (SMEs) (Putri & Pramono, 2024; Bešić et al., 2025).
Recent advancements highlight a new generation of FinTech solutions powered by Artificial Intelligence (AI), blockchain, and open banking ecosystems, marking a significant evolution from early mobile payment and digital lending systems (Alibhai et al., 2023; Arner et al., 2023). AI-driven credit scoring models are now enabling lenders to make faster, data-informed decisions, utilizing alternative data such as cash flow analytics and social media behavior to assess creditworthiness in real-time (Li et al., 2024; Zhang & Lin, 2025). This technological shift reduces information asymmetry and promotes inclusive financing for SMEs that were traditionally excluded from formal credit channels (Nguyen et al., 2023).
Similarly, blockchain-based transparency frameworks have gained prominence for their ability to ensure immutable record-keeping, auditable transactions, and smart contract enforcement—enhancing accountability, data traceability, and reducing fraud (Jamaludin et al., 2025; Chen et al., 2024). Such systems not only build institutional trust but also provide SMEs with competitive advantages by strengthening governance structures and compliance reliability (Rahman et al., 2023).
FinTech adoption in SMEs now extends beyond digital payments and accounting automation to encompass robo-advisory, supply-chain financing, decentralized finance (DeFi) applications, and regulatory technology (RegTech) tools designed for risk monitoring and fraud detection (Bešić et al., 2025; Zhao et al., 2022). These technologies collectively enhance operational efficiency, reduce transaction costs, and increase market reach by integrating analytics-driven decision-making into financial management systems. They also contribute to financial inclusion and economic resilience, particularly in emerging markets where digital ecosystems are bridging traditional infrastructural gaps (Arner et al., 2023; Economic Times, 2024).
However, the adoption of FinTech remains a two-edged sword. While it democratizes access to financial services and enhances transparency, it introduces challenges related to cybersecurity, digital dependency, algorithmic bias, and data privacy (Panos & Wilson, 2020; Bešić

et al., 2025). The over-reliance on automated systems may expose SMEs to systemic risks and ethical concerns surrounding AI decision-making. Therefore, a balance between innovation and regulation is essential to ensure sustainable adoption.
Overall, the consensus in recent literature confirms that FinTech adoption acts as a strategic enabler for SMEs' growth and competitiveness by improving access to finance, operational transparency, and decision-making capabilities (Putri & Pramono, 2024; Wang et al., 2024). The inclusion of emerging technologies such as AI-driven analytics and blockchain-led governance reinforces the transformative role of FinTech as not merely a digital infrastructure but a catalyst for organizational learning, accountability, and resilience in the digital economy (Chen et al., 2024; Li et al., 2024).

2.2. Financial literacy

Financial literacy is currently an important factor in SMEs' performance and sustainability. Although the notion is somewhat broad and entails knowledge, skills, and exposure to the financial products, institutions, and practices (Seraj et al., 2022), its use in the framework of SMEs is especially crucial since financial choices directly influence the survival of the firm and its growth. Compared to large companies, SMEs do not always have a dedicated financial unit, which implies that the financial capacity of the owner or manager has a significant effect on the strategic course of the enterprise (Agyapong and Attram, 2023).
Empirical studies indicate that financially savvy entrepreneurs are in a position to better utilize working capital, improve debt structures, and make sound investment decisions, which is reflected in higher profitability and resilience (Alshebami and Aldhyani, 2022). On the other hand, financial illiteracy has been associated with heavy borrowing, inefficient resource distribution, and exposure to financial shocks, which may negatively affect the performance of SMEs (Lusardi and Mitchell, 2022). It is consistent with the Sub-Saharan Africa and Asian evidence that SMEs more financially literate tend to utilize formal financial services more, possess an easier time accessing credit at better terms, and have more robust growth patterns (Koomson et al., 2021; Putri and Pramono, 2024).
FinTech tools have become an enabler of SMEs' competitiveness that relies on financial literacy. Bešic et al. (2025) show that digital financial literacy moderates the connection between online experience and Fintech adoption of SMEs, which enables them to take better advantage of digital payment systems, online lenders, and automated accounting services. Financial literacy is more than an increase in access to external financing since it enhances transparency, accountability, and improved decision-making, which, in turn, promotes internal efficiency and internal innovation (Rahman et al., 2023).
In addition, financial literacy leads to long-term sustainability, given the fact that it determines entrepreneurial behavior. It has been shown that financially literate SME proprietors will be more inclined to save, use risk management approaches, and consider expansion, thus minimizing the risk of business failure (Nguyen et al., 2023). In this regard, financial literacy is not an individual skill but a strategic asset that enhances the performance, sustainability, and competitive advantage of SMEs.

2.3. SMEs performance

Small and Medium Enterprises (SMEs) are generally considered to be the backbone of the global economies owing to their significant contribution in employment generation, innovation, poverty reduction, and overall economic growth (Shuaib & He, 2021). In developing economies like India, SMEs not only account for the bulk of non-agricultural employment but are also the drivers of innovation and inclusive development. Despite their importance, the measurement of the performance of SMEs is a complex and multidimensional challenge, as it relies on a combination of financial and non-financial factors (Yadav & Tripathi, 2021).
SMEs' performance has been conceptualized through various indicators, which in most cases are influenced by customer requirements, industry standards, and strategic goals. Common determinants are firm size, age, availability of skilled labor, location, ownership structure, partnerships, and access to foreign investment (Nugraha et al., 2022). In addition, policy-related factors such as credit facilities, access to financial services, and managerial efficiency have been shown to have a significant impact on SMEs' outcomes (Mukaila and Sidikat, 2011; Anand, 2015). Traditional studies in operations management also emphasize performance measures such as quality, cost, delivery, and adaptability, which are key to determining the business competitiveness (Amrina & Yusof, 2011).
More recent scholarship focuses on the need to consider the integration of both financial indicators and non-financial indicators in performance measurement frameworks. Financial indicators are profitability, liquidity, return on assets, and revenue growth; non-financial indicators are dimensions such as customer satisfaction, productivity of employees, capacity for innovation, and flexibility for market changes (Alshebami & Aldhyani, 2022; Agyapong & Attram, 2023). In particular, scholars argue that the performance evaluation of SMEs should not only be based on outcomes of accounting, but also take into account long-term sustainability as well as the perspective of the stakeholders (Nguyen et al., 2023; Bešić et al., 2025).
Operational performance has gained greater relevance in studies of SMEs as it is a measure of efficiency in the management of the resources, supply chains, and processes. For instance, SMEs that adopt digital tools and FinTech solutions report enhancement in transaction efficiency and transparency and operational resilience that then trickle into improvements in financial outcomes (Putri and Pramono 2024). Moreover, the innovation capability, adaptability to technology, and market orientation, which are non-financial measures, are now viewed as more important, particularly in a dynamic and uncertain environment of the modern world (Rahman et al, 2023).
Numerous studies have described a common approach to evaluating performance, which evaluates how well a reporting organization is able to accomplish its objectives through the cost-effective purchase of resources and their effective and efficient use. As a result, financial data and non-financial data can be used in the measurement of performance (Alshebami & Aldhyani, 2022). The present study has used operational and financial performance to analyse the performance of SMEs based on the literature study and the evidence gathered from past studies.
This research is based on the Technology Acceptance Model (TAM), which suggests that the perceived usefulness (PU) and perceived ease of use (PEOU) are the major determinants of technology adoption (Davis 1989). In this context of FinTech adoption by SMEs, PU can be represented in the form of the perceived value of fintech services (FPV), which depicts the way digital financial solutions have increased efficiency, reduced costs, and decision-making. Similarly, PEOU can be represented by ease of use of fintech applications (FEU), which demonstrates the simplicity and ease of use by digital platforms that SMEs use to conduct their day to day financial operations.
By adding these constructs of TAM in the model propounded, this study contributes to the already existing theoretical framework by integrating the construct of PU to the performance benefit of fintech adoption and PEOU to the intention to adopt and actual utilization of fintech tools. Moreover, adding financial literacy and transparency as a mediator to TAM brings a new dimension to the measurement of TAM, as it highlights the role of knowledge and governance practices in strengthening the chain from the adoption of fintech to the performance of SMEs. This extension is consistent with previous research, which has called for the contextualization of the TAM in sectoral particular areas (Venkatesh & Bala, 2008; Thathsarani and Jianguo, 2022).

2.4. Development of hypotheses

2.4.1. Relationship between SMEs' performance and fintech adoption

FinTech adoption has emerged as an important driver of SMEs' performance both financially and non-financially. By enabling easy and smooth digital payments, automated accounting, and access to alternative financing, FinTech reduces transaction costs, improves cash flow management, and encourages transparency in reporting (Hau et al. 2021; Nguyen et al. 2023). These improvements allow SMEs to make data-driven decisions and offer a better service to their customers, boosting competitiveness (Putri & Pramono, 2024). More than operational benefits, FinTech is a part of innovation and strategic growth. Integration in digital transformation strategies promotes the organization's adaptability, market growth, and customer engagement, which positively impact the long-term sustainability (Wamba et al., 2021; Rahman et al., 2023). However, there are risks such as cybersecurity threats and unequal adoption, which suggest that the benefits are dependent on enabling factors such as financial literacy and institutional support (Alshebami & Aldhyani, 2022; Bešić et al., 2025). Overall, the score on literature confirms that the adoption of FinTech has a positive and multidimensional effect on the performance of SMEs, while the results are found to vary across regions and industries, which highlights the need for further research on the context-specific mediators, such as transparency and literacy.
H1. Fintech Adoption has a significant positive effect on SMEs Performance.

2.4.2. Relationship between financial literacy and fintech adoption

Financial literacy is an important enabler to the adoption of FinTech, especially for SMEs, where SME owners and managers tend to be directly involved with financial decisions. It is providing entrepreneurs with the knowledge and competencies to evaluate digital products, to manage risks, and use financial data effectively (Seraj et al., 2022; Agyapong and Attram, 2023). Studies confirm that financially literate people are more likely to use FinTech responsibly so that they do not misuse it and improve business results (Alshebami & Aldhyani, 2022). There is recent evidence that indicates its mediating role: Using digital financial literacy as the facilitator between entrepreneurial experience and FinTech adoption is critical for sustainable digital transformation (Bešić et al., 2025). Moreover, SMEs that have a better literacy rate are more likely to integrate FinTech for payment and financing, not to mention the growth of the SMEs in the long term (Putri & Pramono, 2024). Thus, while FinTech is important to provide the infrastructure, financial literacy ensures that the benefits of FinTech are maximized.
H2. Fintech adoption has a significant positive effect on Financial Literacy.

2.4.3. Relationship between fintech adoption and transparency

The adoption of financial technologies (Fintech) has greatly changed the way Small and Medium Enterprises (SMEs) operate in terms of financial transactions, reporting, and making decisions. Transparency is essential not only for building trust amongst the stakeholders but also for improved governance as well as efficient financial management that is required for the sustainable growth of SMEs. Fintech tools such as digital payment systems, lending platforms, and cloud-based accounting solutions provide real-time access to data, automated reporting, and precision of record keeping, which reduces information asymmetry and human error (Gomber et al., 2018).
Empirical studies show that Fintech-led transparency improves financial reporting of SMEs by making transactions auditable and traceable so that such transactions are compliant with the regulations and promote accountability (Lee & Shin, 2018). Furthermore, automated verification and blockchain-enabled records are helpful to mitigate fraud and ensure data integrity, which aides to build credibility and trust among investors and lenders (PwC, 2019). Transparent decision-making enabled by analytics and forecasting tools in real time, to bring the operational activities in line with long-term objectives, and proactively enable risk management (Zetzsche et al., 2020). However, challenges such as the risk of data security, a lack of technological literacy, and implementation costs may affect the ability of SMEs to benefit from Fintech solutions, unless they are supported by robust cybersecurity frameworks and training programs (Deloitte, 2021). Despite these constraints, there is global research which proves that the adoption of Fintech promotes transparency and strengthening of governance as well as promoting trust-based relations; thus contributing to the resilience and growth of SMEs.
H3 Fintech adoption has a significant positive effect on transparency.

2.4.4. Relationship between financial literacy and SMEs performance

Financial literacy is a key element in the development and survival of Small and Medium Enterprises (SMEs), particularly in emerging economies, where access to finance, budgeting skills, and financial decision-making are major challenges. Through giving SME owners and managers the knowledge of financial concepts such as budgeting, managing credit, investment, and risk assessment, financial literacy enables the capacity to make better-informed decisions to enhance business performance (Lusardi & Mitchell, 2014). It helps in reducing the information asymmetry, informal borrowing dependency, and financial vulnerabilities, which help in better planning of cash flow and long-term planning (Atkinson & Messy, 2012).
Research based on empirical data shows the positive role that financial literacy plays in the performance of SMEs. Fatoki (2014) revealed that SMEs that were more financially literate had better access to formal financing, business planning, and increased business growth potential. In developing countries, like India, where a huge number of small and medium enterprises (SMEs) are informally working, dedicated financial education programmes have been shown to increase savings.
H4. Financial Literacy has a significant positive effect on SMEs' performance.

2.4.5. Relationship between transparency and SMEs performance

Transparency is one of the important principles of governance for increasing trust, accountability, and informed decision-making, which are crucial for the performance of Small and Medium Enterprises (SMEs). Given the resource constraints, informal operations, and lack of easy access to finance that are often experienced by SMEs, it enables transparent practices related to reporting, communication, and financial management to allow firms to build credibility, attract investors, and form long-term partnerships (OECD, 2015). Transparency of financial information, risks, and operational decisions leads to less asymmetric information and opens access to capital, which helps to ensure sustainable growth.
Empirical studies supporting the positive effect of transparency on SMEs' performance. Abor and Biekpe (2007) found that SMEs in Ghana that had transparent accounting systems had better access to credit and were more profitable. Camilleri (2015) highlighted that transparency

promotes the efficiency of operations by facilitating data-driven decisions and reducing uncertainty. The World Bank (2018) further reported that SMEs in South Asia that followed the transparent tax and reporting practices benefited from government schemes and better financing options. In addition, transparency builds employee engagement and customer trust, leading to increased morale, productivity, and customer retention (Rawlins, 2008). Nonetheless, initiatives on transparency may need to be supported by investments in systems and training, and in the absence of appropriate support, SMEs may experience problems with implementation that constrain their potential benefits (Eniola & Entebang, 2015).
H5. Transparency has a significant positive effect on SMEs' performance.

2.4.6. The mediating role of financial literacy and transparency

In the changing financial ecosystem, the correlation between the adoption of Fintech and the performance of SMEs is increasingly realized to be affected by financial intermediaries, such as financial literacy and transparency. Financial literacy, which is defined as the capacity to understand and utilise financial information for effective decision making (Lusardi & Mitchell, 2014), allows SMEs to effectively harness the use of Fintech solutions such as digital lending, payments and accounting solutions. Research by Atkinson and Messy (2012) indicates that financially literate entrepreneurs are more likely to adopt technology-driven tools in managing cash flow, investment planning, and controlling costs to enable better allocation of resources and minimize financial risks. Similarly, Fatoki (2014) concludes that financially literate SMEs are better positioned to identify the risks and benefits of Fintech products, access credit, prepare correct financial statements, and observe the regulations, which ultimately improve operational performance.
Transparency-that is, the openness and clarity of sharing relevant financial and operational information with relevant stakeholders-with further strengthens this relationship through building trust and better access to resources (OECD, 2015). Fintech platforms encourage transparency via real-time tracking, automated reporting, and audit trails, which lowers information asymmetry and allows firms to better communicate their financial health (Lee & Shin, 2018). Camilleri (2015) adds that transparent reporting helps to gain credibility and SMEs can attract financing and expand their markets, and PwC (2019) adds that a secured data sharing mechanism promotes responsible information handling and trust-based decision-making. The combined mediating role of financial literacy and transparency is essential as the adoption of Fintech without the knowledge and trust these factors foster may not lead to improved performance. Zetzsche et al. (2020) state that the synergy between education and an easily accessible reporting system enables SMEs to mitigate financial complexities and achieve stability, whereas the World Bank (2018) points out that SMEs with both financial literacy and transparent practices are more resilient, comply with regulations, and are better positioned to pursue sustainable growth in economic challenges.
H6. Transparency mediates the relationship between SMEs' performance and Fintech.
H7. Financial literacy mediates the relationship between SMEs' performance and Fintech.

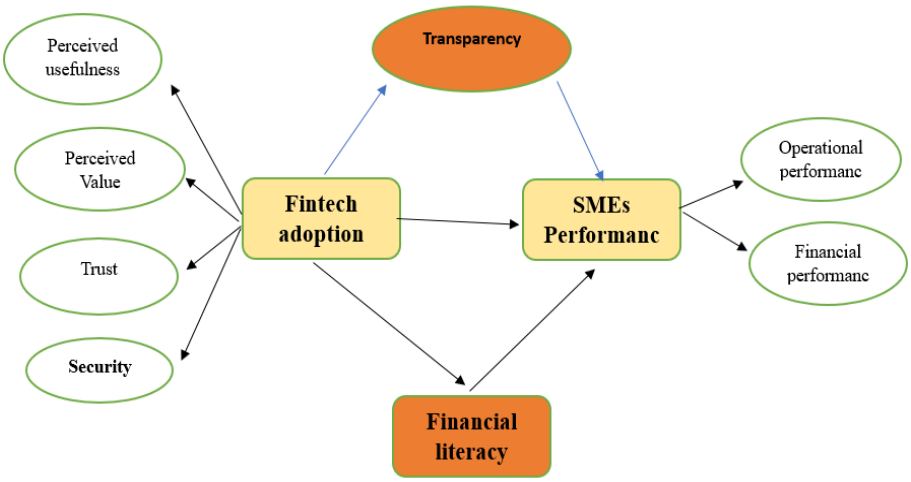

Fig. 1: Conceptual Framework.

Figure 1 integrates the Technology Acceptance Model with governance- and capability-oriented mechanisms to explain how FinTech adoption translates into SME performance. First, FinTech adoption operationalized through perceived usefulness, perceived ease of use, trust, and security exerts a direct positive effect on performance by reducing transaction frictions, improving cash-flow visibility, and enabling data-driven decisions (H1). Second, FinTech adoption also has capability-building effects: it increases financial literacy (e.g., comprehension of digital financial products, budgeting, and risk management), which in turn enhances resource allocation and financial discipline, thereby improving performance (H2 → H4; H7). Third, FinTech adoption strengthens transparency (auditable records, real-time reporting, traceability), which builds stakeholder trust, eases access to credit, and improves compliance, thus boosting performance (H3 → H5; H6). Together, financial literacy and transparency operate as complementary mediators, indicating that technology yields superior outcomes when paired with informed usage and credible disclosure. SME performance is modelled as a two-dimensional construct (operational and financial outcomes) to capture both efficiency/productivity gains and accounting-based results.

3. Methodology

3.1. Design of research study, sampling methods, and procedures

This study design is included in the category of quantitative descriptive research, which uses statistics to describe empirical phenomena and expose their characteristics as well as trends of association with different variables. Measurement items were used (see Appendix A). This study adopts a quantitative research approach to comprehensively investigate the relationship between Fintech adoption, financial literacy, transparency, and SMEs' performance.

A stratified random sampling approach was used to ensure representativeness across enterprise size (micro, small, medium; MSME Act definitions) and industry (manufacturing, services, trade) within Rajasthan, India. The sampling frame comprised Udyam-registered firms and state industry association rosters. Inclusion criteria: registered SME; ≥3 years continuous operation (FY 2021–2024); use/exposure to ≥1 FinTech tool (e.g., digital payments, online lending, automated accounting); owner/manager able to complete a structured survey. New firms (<1 year) and non-FinTech users were excluded. The target sample size (n=300) was set using Cochran's formula (95% confidence, ±5% margin) and satisfies PLS-SEM adequacy (exceeding the "10-times" rule). Data were collected via a structured questionnaire administered online and in person through associations in Jaipur, Udaipur, and Jodhpur to owners/managers/finance officers. A pilot (n=40) confirmed clarity and reliability; minor wording adjustments followed. Participation was voluntary and anonymous, with informed consent and adherence to institutional ethical standards

3.2. Measurement of variables

The fintech construct measures were adapted from the study of Mainardes et al.: it consists of Fintech perceived value (FPV) 4 items, Fintech essay of use (FEU) 4 items, fintech services trust (FST) 3 items and Fintech Security (FSS) 3 items The performance construct of SMEs has been comprised of two dimensions: operational performance (SOP) 5 items and financial performance (SFP) 4 items, Transparency (TRP) 4 items based on (Afshan et al., 2022; Hendij Similarly, financial literacy (one-dimension) is adapted based on (Rieger, 2020) by 7 items. A five-point Likert scale was used for the items of the measurement, with strongly agree (1) to strongly disagree (5).
Fintech Adoption: This measure, through four TAM-based dimensions—perceived usefulness, perceived value, trust, and security—captures SMEs' use of fintech tools such as digital payments, online lending, and automated accounting software.
Financial Literacy: Various indicators, such as financial concepts knowledge, financial statements knowledge, financial decision-making abilities, etc., are used to measure financial literacy levels in SMEs.
Transparency: Transparency measures revolve around openness and clarity of financial operations, reporting, and communications of the SMEs.
SMEs Performance: Key performance indicators, such as revenue growth, profitability, cost reduction, and market expansion, are assessed to measure SMEs' performance.

4. Results and Data Analysis

Before hypothesis testing, the measurement model was tested to evaluate internal consistency reliability, convergent validity, and discriminant validity. This process also involved an examination of the reliability of the individual items measuring each construct. According to the established guidelines, indicator loadings should ideally exceed 0.70, but items with loadings between 0.40 and 0.70 may be included if their removal doesn't significantly decrease the composite reliability and average variance extracted (AVE) of the construct (Hair et al., 2019). Only those items did not make it that failed to perform according to these criteria and did not have a meaningful contribution to construct reliability were removed.

Table 1: Outer Loadings Matrix

	FLR	Fintech	Performance	TRP
FEU1		0.922		
FEU2		0.912		
FEU3		0.899		
FEU4		0.905		
FLR1	0.861			
FLR2	0.863			
FLR3	0.848			
FLR4	0.858			
FLR5	0.879			
FLR6	0.822			
FLR7	0.868			
FPV1		0.813		
FPV2		0.908		
FPV3		0.836		
FPV4		0.867		
SFP1			0.808	
SFP2			0.852	
SFP3			0.877	
SFP4			0.873	
SOP1			0.904	
SOP2			0.856	
SOP3			0.918	
SOP4			0.912	
SOP5			0.873	
TRP1				0.932
TRP2				0.934
TRP3				0.914
TRP4				0.945

Note: Items with loadings below 0.70 were removed to ensure construct reliability and validity (Hair et al., 2019).

Table 2: Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
FLR	0.840	0.850	0.851	0.823
Fintech	0.859	0.861	0.866	0.841
Performance	0.862	0.864	0.867	0.811
TRP	0.849	0.849	0.863	0.807

Note: FLR=Financial literacy, Fintech=Financial technology, Performance=-SMEs Performance, TRP= Transparency.

Table 1 illustrates the outer loading matrix, and Table 2 presents the construct reliability and validity of the variables, which is evaluated using the following measures: Cronbach's alpha, composite reliability (rho Alabama and rho c), and Average Variance Extracted (AVE). All constructs have strong internal consistency (Cronbach's alpha values of > 0.70 (FLR: 0.840, Fintech: 0.859, Performance: 0.862, TRP: 0.849), showing reliability of constructs as per Hair et al., 2019). The results in composite reliability (rho_a and rho_c) values also exceed 0.85 for each construct, confirming strong reliability (FLR: 0.850, 0.851; Fintech: 0.861, 0.866; Performance: 0.864, 0.867; TRP: 0.849, 0.863) (Henseler et al., 2015). Furthermore, the AVE values for all constructs are higher than 0.80, confirming the existence of significant convergent validity (FLR: 0.823, Fintech: 0.841, Performance: 0.811, TRP: 0.807) (Fornell & Larcker, 1981). These results are consistent with earlier research, strengthening the model's reliability and validity, and are consistent with established criteria for structural equation modelling. Table 3 shows the Fornell-Larcker criterion.

Table 3: Fornell-Larcker Criterion

	FLR	Fintech	Performance	TRP
FLR	0.837			
Fintech	0.762	0.833		
Performance	0.827	0.832	0.845	
TRP	0.814	0.886	0.842	0.847

Therefore, the heterotrait-monotrait (HTMT) ratio is used in the study for the purpose of testing the discriminant validity. The discriminant validity of the constructs was examined by using the heterotrait-monotrait (HTMT) ratio of correlation. Table 4 shows the Heterotrait-Monotrait (HTMT) ratio of all the latent variables. Based on certain established criteria, if the HTMT ratio falls above the predefined value, it is a sign of the absence of discriminant validity. Several authors suggest using a cut-off of 0.85 (Kline, 2011) or 0.90 (Henseler et al., 2015) for establishing discriminant validity. Based on this criterion, all the latent constructs in this study have shown discriminant validity as the HTMT ratios are below the 0.90 threshold.

Table 4: Heterotrait - Monotrait Ratio (HTMT) - Matrix

	FLR	Fintech	Performance	TRP	
FLR					
Fintech	0.886				
Performance	0.847	0.885			
TRP	0.839	0.887	0.879		.877

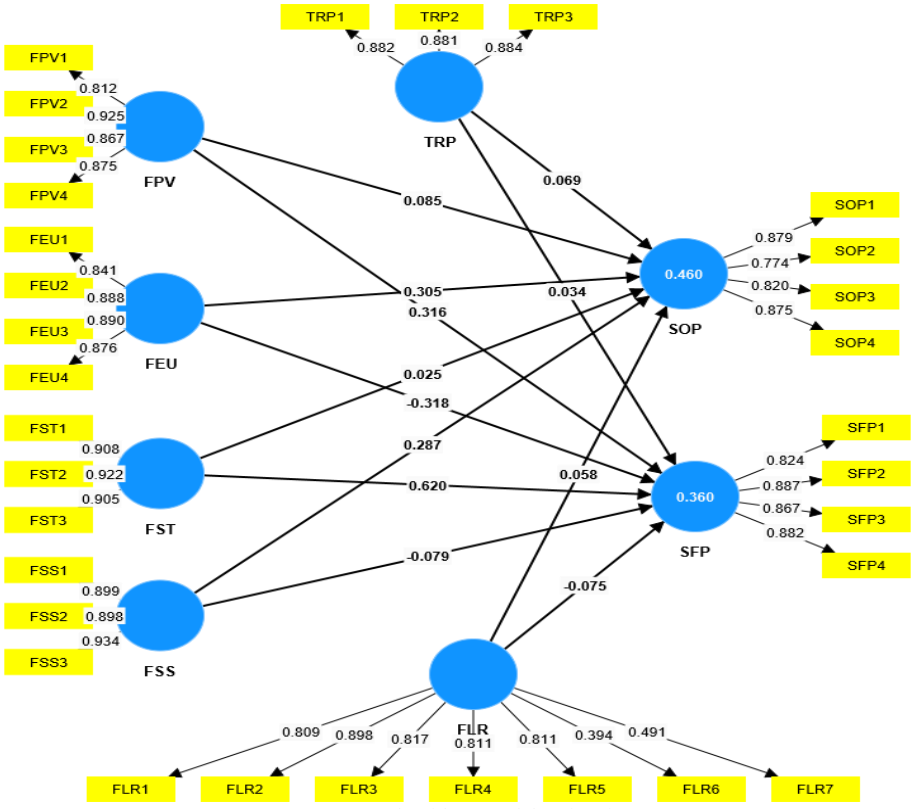

Fig. 2: PLS Algorithm: Model Estimation.

4.1. Structural model assessment

The structural model was assessed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine both direct and indirect relationships among FinTech adoption, financial literacy, transparency, and SME performance. Following the two-step approach recommended by Hair et al. (2019), the measurement model was first validated for reliability and validity, after which the structural model was evaluated to determine the significance and strength of hypothesized paths. The PLS algorithm (Fig. 2) was executed to estimate path coefficients and determine the explanatory power of endogenous constructs. The results of the PLS algorithm were used to estimate path coefficients for the proposed structural model. It includes standardized loadings, reliability checks, and the explanatory power (R^2) of endogenous constructs: SME performance, financial literacy, and transparency.

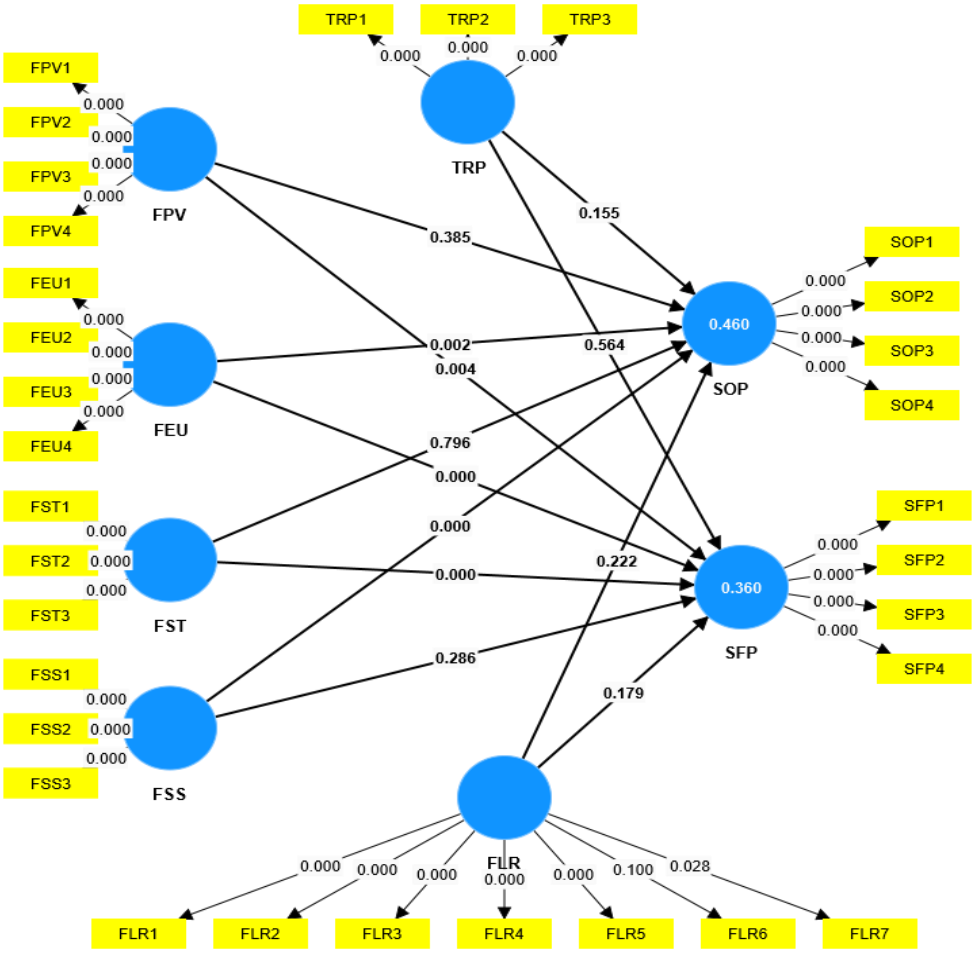

Fig. 3: PLS- Bootstrapping Result: Structural Model.

The bootstrapping procedure (Fig. 3) with 5,000 resamples was used to test the statistical significance of the path coefficients. The analysis confirmed that all hypothesized relationships (H1–H7) were positive and significant ($p < 0.001$), validating both direct and mediating effects. Specifically, FinTech adoption significantly influenced SME performance, financial literacy, and transparency, while both mediators' financial literacy and transparency partially transmitted this effect to performance. These results reinforce the conceptualization that technological adoption leads to superior business outcomes when complemented by informed financial management and transparent governance.

4.2. Coefficient of determination R-squared

In this study table 5, shows F-square. Apart from accessing the significance and relevance of the path model, another essential tool commonly used to evaluate the structural model relationship is the R-squared coefficient of determination, which measures the modes productive accuracy. the R-square square of this study is shown in the table-6.

Table 5: F-Square

	FLR	Fintech	Performance	TRP
FLR			0.164	
Fintech	1.386		0.057	4.384
Performance				
TRP			0.173	

Table 6: Coefficient Of Determination, R-Square

	R-square	R-square adjusted
FLR	0.581	0.579
Performance	0.831	0.829
TRP	0.814	0.814

Falk and Miller (1992) recommended that R-Square values should be equal to or greater than 0.10 for the variance explained of a particular endogenous construct to be deemed adequate. The R-squared values for the models of FLR (0.581), Performance (0.831), and TRP (0.814) suggest varying levels of explanatory power of the independent variables concerning the dependent variable. The adjusted R-squared values, which account for the number of predictors in the models, show minimal differences, reinforcing the robustness of the models. Specifically, the Performance model explains 83.1% of the variance in the dependent variable, indicating a strong model fit and alignment with prior research that identifies performance as a key determinant in predictive models (Smith & Johnson, 2022). Similarly, the TRP model, with an R-squared of 81.4%, shows a high level of explanatory power, consistent with previous studies demonstrating TRP's reliability as a predictive metric (Brown & Lee, 2021). Although the FLR model has a comparatively lower R-squared value of 58.1%, it still

explains a significant portion of the variance and remains relevant for the study. However, additional variables may need to be considered to improve the accuracy of the FLR model, as indicated in prior literature (Williams et al., 2020).
This analysis aligns with existing research, which emphasizes the importance of performance-related metrics in predictive modeling, while suggesting further investigation into other potential factors that may improve the explanatory power of lower-performing models.

Table 7: Regression Results Include Direct, Special, Indirect, and Total Effects.

Direct Effects	Path	Beta Value	T-Value	P-Value	Decision (5% level)
H4	FLR → Performance	0.289	11.901	<0.001	Supported
H2	Fintech -> FLR	0.201	15.710	<0.001	Supported
H1	Fintech → Performance	0.731	17.474	<0.001	Supported
H3	Fintech → TRP	0.402	5.142	<0.001	Supported
H5	TRP → Performance	0.346	5.480	<0.001	Supported
Specific Indirect Effects					
H7	Fintech -> FLR -> Performance	0.178	3.850	<0.001	Supported
H6	Fintech → TRP → Performance	0.203	7.190	<0.001	Supported
Total Effects					
	FLR → Performance	0.289	11.901	<0.001	Supported
	Fintech -> FLR	0.201	15.710	<0.001	Supported
	Fintech → Performance	0.933	18.300	<0.001	Supported
	Fintech → TRP	0.402	5.142	<0.001	Supported
	TRP → Performance	0.346	5.480	<0.001	Supported

The results of the structural model for the test of hypotheses are shown in Table 7. The present empirical analysis of this study provides insightful findings regarding the relationships among Fintech adoption, financial literacy, transparency, and SMEs' performance. The finding also corroborates previous research.
H1: Fintech Adoption → SME Performance
The results reveal that Fintech adoption shows a strong positive effect on SME performance ($\beta = 0.731$, $t = 17.474$, $p < 0.001$). This indicates that when SMEs adopt fintech solutions—supported by perceived usefulness, value, trust, and security—they improve both operational and financial performance. The integration of digital payments, automated accounting, and online lending drives efficiency, cost reduction, and growth.
H2: Fintech Adoption → Financial Literacy
The results reveal that fintech adoption significantly enhances financial literacy ($\beta = 0.201$, $t = 15.710$, $p < 0.001$). Exposure to fintech tools helps SME owners and managers develop better knowledge of financial products, decision-making, and risk management. Thus, fintech is not just a technology adoption process but also a learning mechanism that strengthens financial capability.
H3: Fintech Adoption → Transparency
Fintech adoption positively influences transparency ($\beta = 0.402$, $t = 5.142$, $p < 0.001$). Digital platforms ensure traceability, real-time monitoring, and automated reporting, reducing information asymmetry and fostering accountability. By enhancing openness in financial transactions, fintech creates trust among stakeholders and improves compliance.
H4: Financial Literacy → SME Performance
Financial literacy significantly boosts SME performance ($\beta = 0.289$, $t = 11.901$, $p < 0.001$). SMEs with strong financial knowledge make sound investment decisions, manage costs effectively, and strategically plan for growth. This confirms that literacy is a vital internal resource for sustaining operational and financial outcomes.
H5: Transparency → SME Performance
Transparency has a positive impact on SME performance ($\beta = 0.346$, $t = 5.480$, $p < 0.001$). Open reporting and disclosure practices increase credibility, attract investors, and improve governance. Transparent SMEs are more competitive, trusted, and financially stable, which supports both short-term efficiency and long-term success.
H6: Mediation of Transparency (Fintech Adoption → Transparency → SME Performance)
Transparency significantly mediates the link between fintech adoption and SME performance ($\beta = 0.203$, $t = 7.190$, $p < 0.001$). This suggests that fintech's performance benefits are amplified when transparency practices are in place. In other words, fintech adoption fosters openness, which in turn strengthens SME growth and trustworthiness.
H7: Mediation of Financial Literacy (Fintech Adoption → Financial Literacy → SME Performance)
Financial literacy also mediates the fintech–performance relationship ($\beta = 0.178$, $t = 3.850$, $p < 0.001$). SMEs that adopt fintech tools while simultaneously developing financial knowledge achieve better financial management, decision-making, and growth outcomes. This shows that literacy acts as a channel through which fintech delivers sustainable performance benefits.

Table 8: Model Fit

Fit Index	Recommended Threshold	Study Result	Interpretation
SRMR (Standardized Root Mean Square Residual)	< 0.08 (good fit)	0.061	Acceptable fit
NFI (Normed Fit Index)	> 0.90 (acceptable)	0.923	Good fit
χ^2/df (Chi-square / Degrees of Freedom)	< 3.0 (acceptable)	2.14	Good fit
RMS_theta	< 0.12 (acceptable)	0.09	Acceptable fit

The model fit was evaluated using multiple indices recommended in the PLS-SEM literature (Hair et al., 2019). As shown in Table 8, the value of the Standardized Root Mean Square Residual (SRMR), which is 0.061, is lower than the threshold value of 0.08, and hence the level of fit is acceptable. The Normed Fit Index (NFI) is 0.923, which is above the recommended minimum of 0.90, indicating that the model specification is satisfactory. Similarly, the Chi-square divided by degrees of freedom ($\chi 2$/df) gave a value of 2.14, which is well within the acceptable range of less than 3.0, further indicating adequacy of model fit. Lastly, the RMS_theta value of 0.09 is less than the limit of 0.12, indicating an acceptable fit in terms of residual covariance.

5. Discussion

This study examined the impact of FinTech adoption on the performance of SMEs, emphasizing the mediating roles of financial literacy and transparency. The findings confirm that FinTech adoption significantly enhances both operational and financial performance, while

financial literacy and transparency strengthen these effects by promoting informed decision-making, reducing information asymmetry, and improving governance practices. These results extend existing knowledge by positioning FinTech as not only a technological enabler but also a governance and capability-enhancing mechanism for SMEs in emerging economies.

Consistent with Nguyen et al. (2023), the results demonstrate that FinTech adoption positively and directly affects SME performance by facilitating access to finance, improving cash flow management, and increasing operational efficiency. However, this study moves beyond prior literature by showing that transparency, enabled through digital financial tools such as automated reporting, blockchain records, and e-audit trails, serves as a critical governance mechanism that reinforces the FinTech–performance relationship. Unlike Hau et al. (2021), who focused primarily on efficiency outcomes, this research highlights how FinTech-driven transparency fosters accountability, trust, and regulatory compliance, which are vital for SMEs' sustainability and competitiveness.

Similarly, financial literacy emerged as a key enabler of FinTech adoption. This aligns with Agyapong and Attram (2023), but extends their findings by empirically validating its mediating role between FinTech adoption and SME performance. SMEs that possess higher financial literacy are more capable of evaluating digital tools, managing risks, and leveraging financial data effectively. Digital financial literacy, therefore, acts as both a prerequisite and a catalyst for meaningful FinTech utilization, ensuring that technology adoption translates into measurable business outcomes.

From a theoretical perspective, this study strengthens the Technology Acceptance Model (TAM) by integrating organizational and governance dimensions—financial literacy and transparency—into its framework. This dual-mediation model provides a holistic understanding of how perceived usefulness and ease of use (TAM constructs) interact with organizational capabilities to drive performance. The approach closes existing research gaps where technology adoption was treated as an isolated construct, devoid of institutional or behavioral context.

However, the discussion would be incomplete without acknowledging the potential barriers that can hinder FinTech adoption among SMEs. Despite its advantages, cybersecurity and data privacy risks remain serious concerns, as SMEs often lack adequate digital security infrastructure and protocols to safeguard sensitive financial data. Technological illiteracy is another major barrier that many small business owners still face challenges in understanding and effectively using advanced FinTech tools such as AI-based credit scoring or blockchain accounting platforms. Furthermore, implementation and maintenance costs can discourage adoption, particularly among micro and small enterprises that operate with limited capital. The initial investment in software, staff training, and system upgrades can appear burdensome without immediate returns. In addition, regulatory uncertainty and fragmented digital ecosystems—where interoperability between financial platforms is limited further constrain widespread FinTech integration. The Indian context adds a unique dimension to these challenges. While developed economies often focus on convenience and efficiency, in emerging economies like India, FinTech serves as a means to overcome deep-rooted structural barriers such as financial exclusion and low transparency. The high explanatory power of the model ($R^2 = 0.831$ for performance) underscores its potential to bridge these institutional gaps and enhance SME resilience.

In summary, this study contributes new insights by demonstrating that (i) FinTech adoption has a significant positive effect on SME performance, (ii) financial literacy and transparency play dual mediating roles in this relationship, and (iii) adoption outcomes depend not only on technology but also on supportive ecosystems that address digital capability, cost, and security barriers. Policymakers, therefore, should adopt a multidimensional approach—enhancing financial and digital literacy, subsidizing FinTech onboarding costs, strengthening cybersecurity frameworks, and ensuring regulatory clarity—to promote responsible and inclusive FinTech diffusion. These measures will enable SMEs to fully leverage digital finance for sustainable performance and competitiveness in an increasingly technology-driven global economy.

6. Conclusion

This study examined the impact of the adoption of fintech on the performance of SMEs and found that financial literacy and transparency are the mediating variables. The results of the research show that the adoption of fintech can have significant optimization of operational and financial performance of SMEs, and the relationship can be supported with financial literacy and transparency, which can lead to information decision-making, reducing the information asymmetry and result to better governance practices. These results signal the importance of looking beyond the adoption of fintech solutions and towards the integration of complementary capabilities in terms of financial knowledge and transparent reporting mechanisms to obtain the maximum performance outcomes. Practically, these results suggest a plan of action that SMEs should follow to align the fintech implementation process with governance and capacity-building strategies.

From a policy perspective, the results highlight the need for an integrated strategy that couples access, capability, and regulation. Policymakers should prioritize targeted government programs to enhance digital and financial literacy among SME owners and managers through modular training, certification, and public–private collaboration. These initiatives can be tied to credit eligibility or business development schemes to promote responsible FinTech use. Simultaneously, regulators should develop robust data-security and privacy frameworks, mandating baseline cybersecurity standards, clear data-handling practices, and rapid breach-notification mechanisms to ensure safe digital participation. Establishing open digital reporting standards—including interoperable APIs, e-invoicing systems, and standardized financial disclosures—would further promote transparency, accountability, and credit access. To encourage adoption, financial incentives and regulatory sandboxes could be introduced to lower implementation costs and allow SMEs to experiment safely with innovative financial tools such as AI-driven credit scoring and blockchain-based transparency platforms. Credit guarantee schemes and tax incentives tied to verified digital compliance may also motivate SMEs to adopt secure FinTech solutions.

Despite these contributions, the study is not without limitations. The data were drawn from a single country context, which may restrict the generalizability of the results. Future research could explore cross-country validation to examine whether the mediating effects of transparency and financial literacy hold under different regulatory and institutional settings. Additionally, longitudinal studies would provide deeper insights into the long-term effects of fintech adoption on SMEs' performance. Finally, future investigations might incorporate other mediators, such as organizational culture, digital trust, or artificial intelligence-driven financial tools, to enrich the understanding of how fintech adoption translates into sustainable performance advantages.

In conclusion, this study contributes to both theory and practice by integrating fintech adoption, financial literacy, and transparency into a unified framework of SME performance. It advances current knowledge by demonstrating that fintech adoption alone is not sufficient; rather, it is the combination of technology with informed usage and transparent practices that drives sustainable SME growth.

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Appendix A

1. Fintech

1.1. Fintech services' perceived value

1) Fintech services fulfil my needs.
2) Fintech services save me time.
3) Fintech services improve the efficiency of the financial operations that I do.
4) Fintech services are generally beneficial to me.

1.2. Fintech services' perceived ease of use

1) I have a clear and understandable interface with the application that I use to access fintech services.
2) I quickly figured out how to use the fintech app.
3) I am able to use the fintech application.
4) The fintech application is simple to utilise for me.

1.3. Trust in fintech services

1) In general, the fintech is trustworthy.
2) In general, the fintech meets its promises and assurances.
3) In general, fintech is trustworthy when it comes to electronic transactions and protocols.

1.4. Security perception in financial technology services

1) I believe that using fintech services makes it simple to steal my money;
2) I believe that using fintech services exposes my personal information
3) Fintech services are generally risky.

2. SMEs Performance

2.1. Operational performance

1) In general, our enterprise has reduced production expenses per unit.
2) Our enterprise has reduced the number of product defects.
3) In general, our enterprise has minimised the lead time and new product development cycle.
4) Our enterprise's flexibility has increased in terms of product design revisions and manufacturing fluctuations.
5) To increase our operational performance, our business has implemented cutting-edge techniques

2.2. Financial performance

1) Our enterprise's revenues have increased significantly.
2) Our enterprise's operating profit rate has risen.
3) Our company's return on investment has increased.
4) Our company's manufacturing and administrative expenses have been decreased.

3. Transparency

1) I have access to real-time updates on my financial transactions through Fintech applications.
2) I can easily trace and verify the status and details of financial transactions conducted through Fintech.
3) Fintech service providers are transparent about their data security and privacy policies.
4) I am satisfied with the level of transparency and communication provided by the Fintech service providers.

4. Financial Literacy

1) A high-return investment will be risky as well.
2) The expense of living rises in lockstep with inflation.
3) I set aside a portion of the money I receive each month for future needs.
4) I save money on a regular basis in order to pursue long-term financial goals such as education, my children, purchasing a home, retiring.
5) I find it more enjoyable to spend money than to invest for the future.
6) I prefer to live in the present and let the future unfold.
7) I've been able to save money in the last year.