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(Review Article)

Promoting sustainable growth of MSMEs through inclusive financial technologies, strategic collaborations, and capacity-building within evolving banking landscapes

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Abstract

Micro, Small, and Medium Enterprises (MSMEs) are critical drivers of employment, innovation, and economic diversification in both emerging and developed economies. Despite their significance, MSMEs often encounter structural barriers to finance, including limited collateral, insufficient credit history, and inadequate capacity to navigate formal banking processes. Traditional financial institutions, though stable and regulated, have historically struggled to address these gaps, while digital financial technologies (fintech) have introduced innovative solutions that remain uneven in accessibility and scalability. This intersection of limitations and opportunities necessitates a comprehensive framework that integrates inclusive financial technologies, strategic partnerships, and targeted capacity-building measures. This article explores pathways to promote sustainable MSME growth by leveraging evolving banking landscapes that combine traditional stability with digital innovation. It examines how inclusive technologies ranging from mobile banking and digital wallets to blockchain-based platforms can expand access to affordable finance while reducing transaction costs and broadening outreach. The role of strategic collaborations between governments, development agencies, fintech innovators, and cooperative banks is highlighted as pivotal in creating scalable ecosystems for MSME financing. Additionally, capacity-building interventions, such as financial literacy programs and digital skills training, are emphasized as essential for enabling MSMEs to adopt and benefit from new financial tools effectively. By situating MSME growth within a broader context of sustainable financial development, the paper underscores how inclusive financial ecosystems can support resilience, competitiveness, and long-term stability. Ultimately, the integration of inclusive technologies, partnerships, and capacity-building is positioned as a transformative pathway for enabling MSMEs to thrive within dynamic, evolving banking landscapes.

Keywords: MSMEs; Inclusive finance; Fintech; Strategic collaborations; Capacity-building; Sustainable growth

1. Introduction

1.1. MSMEs as pillars of global and local economies

Micro, small, and medium-sized enterprises (MSMEs) constitute the backbone of both global and local economies, accounting for more than 90 percent of firms worldwide and a substantial share of employment [1]. They drive innovation, foster entrepreneurship, and create opportunities in regions where large-scale industries are either absent or insufficiently inclusive [4]. MSMEs generate value not only through production and trade but also by linking informal and formal economic activities, thereby enabling communities to transition toward structured economic participation [2].

In developing economies, MSMEs play a critical role in poverty alleviation by absorbing labor from vulnerable groups and providing income-generating opportunities [3]. Their decentralized nature makes them uniquely positioned to

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respond to local market demands and to adapt quickly to economic shocks [4]. By embedding themselves in community networks, MSMEs promote social cohesion and act as vehicles for equitable economic growth [5].

At the global level, MSMEs increasingly participate in cross-border value chains, exporting niche products and services while driving competition and innovation [5]. Their dual role as local stabilizers and global contributors highlights their indispensable nature. Despite their importance, however, they continue to face structural challenges that limit their full potential in fostering sustainable development [2].

1.2. Persistent challenges in MSME growth and sustainability

Despite their economic contributions, MSMEs remain disproportionately constrained by structural and institutional barriers [1]. Limited access to finance persists as one of the most cited challenges, with many enterprises unable to secure affordable credit due to collateral requirements and perceived risk profiles [5]. This exclusion often compels entrepreneurs to rely on informal financing, which can be unreliable and costly [6].

Regulatory environments add another layer of difficulty. Bureaucratic hurdles, excessive taxation, and complex compliance requirements often discourage small firms from formalizing operations [4]. In many regions, inconsistent policy implementation and weak legal protections exacerbate these barriers [2]. Additionally, infrastructure gaps such as unreliable electricity, poor transport systems, and limited digital connectivity hamper competitiveness and scalability [7].

Human capital challenges also persist. MSMEs often lack access to skilled labor and management expertise, constraining their capacity to innovate or expand [3]. Moreover, in highly competitive environments, they face difficulties integrating into formal supply chains dominated by larger corporations [1].

These challenges collectively undermine growth and sustainability. While MSMEs continue to demonstrate resilience, addressing these persistent obstacles requires transformative solutions that go beyond incremental policy adjustments and extend into technological and financial innovation [6].

1.3. The transformative potential of inclusive financial technologies

The rise of inclusive financial technologies presents an opportunity to bridge long-standing gaps in MSME financing and sustainability [2]. Digital banking platforms, mobile money systems, and fintech solutions reduce reliance on traditional banking infrastructure, allowing enterprises to access financial services more affordably and efficiently [4]. For example, mobile-based credit products can evaluate transaction histories and utility payments as alternative data sources for creditworthiness, bypassing the need for conventional collateral [7].

Blockchain technologies further enhance transparency and trust in financial transactions, offering immutable records that can reduce fraud and improve contract enforcement [3]. Similarly, AI-driven credit scoring models enable lenders to extend financing to MSMEs that would otherwise be excluded under traditional risk assessment frameworks [6]. By democratizing access to finance, these technologies empower small businesses to scale operations, expand into new markets, and strengthen resilience against shocks [1].

Beyond finance, inclusive technologies also improve access to insurance, supply chain integration, and digital marketplaces [5]. These innovations not only enhance operational efficiency but also foster broader participation in formal economic systems. When implemented equitably, financial technologies have the transformative potential to unlock MSMEs' capacity for innovation, competitiveness, and sustainable growth [2].

1.4. Objectives and scope of the article

This article seeks to explore the dual realities of MSMEs: their centrality to economic development and the persistent barriers constraining their growth [4]. The primary objective is to examine how inclusive financial technologies can serve as transformative tools for overcoming these barriers while fostering sustainability [1]. Specifically, the study highlights how digital platforms, AI-enabled credit models, and blockchain solutions can enhance financial inclusion and resilience for MSMEs [3].

The scope encompasses both developed and emerging economies, recognizing that while challenges differ by context, themes of financial access, regulatory burdens, and competitiveness remain consistent [6]. The analysis integrates insights from global experiences to show how lessons from one region can inform strategies in another [5].

Furthermore, the article situates MSME development within the broader framework of sustainable economic growth, social equity, and digital transformation [2].

The significance of this study lies in its interdisciplinary perspective. By linking economic development, financial innovation, and technological adoption, it contributes to policy debates and practical solutions for MSME advancement [7]. Ultimately, the article argues that achieving sustainable development goals requires prioritizing MSMEs not only as economic actors but also as catalysts for inclusive, technology-driven transformation [4].

2. MSMEs and financial exclusion challenges

2.1. Credit access gaps and structural financing barriers

Despite their economic importance, MSMEs face chronic difficulties in accessing credit, a problem deeply rooted in structural financing barriers [8]. Formal lenders often perceive smaller enterprises as high-risk borrowers due to limited assets, inconsistent revenues, and high default rates [10]. As a result, they are frequently excluded from mainstream financial products that are otherwise available to larger firms [12].

Collateral requirements represent one of the most significant obstacles. Banks typically demand property deeds or other tangible guarantees that many small businesses cannot provide [7]. Even when collateral exists, its value may not meet institutional thresholds, leaving entrepreneurs unable to secure loans adequate for growth [13].

Additionally, MSMEs often struggle with incomplete or informal financial records [9]. Without credit histories or standardized documentation, they fail to satisfy due diligence processes in formal banking systems. This reinforces a cycle where exclusion from finance prevents them from building the very records that would legitimize future borrowing [11].

The structural gap in credit access has broader implications for economic equity. Small businesses remain vulnerable to liquidity crises, unable to invest in innovation or scale operations [12]. Addressing these barriers requires systemic reforms that reconfigure how financial institutions assess and support MSME creditworthiness [8].

2.2. Institutional limitations of conventional banking for MSMEs

Conventional banking institutions often lack the structural flexibility to cater effectively to MSMEs [7]. Their business models prioritize economies of scale, standardization, and low transaction costs, which conflict with the diverse and fragmented nature of MSME financing needs [13]. As a result, small businesses are frequently marginalized, despite their critical role in economic ecosystems [10].

One limitation is the high cost of serving small borrowers. Processing, monitoring, and enforcing loans for MSMEs often involves greater administrative effort relative to the loan size [9]. Banks perceive this as an inefficient use of resources compared with servicing larger corporate clients [12].

Moreover, rigid lending criteria create systemic exclusion. Many institutions rely heavily on credit scoring systems that prioritize historical financial records, which MSMEs often lack [8]. This leads to high rejection rates, even for businesses with strong potential but limited formal documentation [11].

Geographic limitations also play a role. Conventional banking infrastructures are often concentrated in urban centers, leaving rural or semi-formal enterprises underserved [10]. This mismatch between institutional priorities and MSME realities highlights why conventional banking models remain inadequate for inclusive finance [7].

Overcoming these institutional shortcomings demands rethinking financial products, delivery mechanisms, and risk assessment frameworks. Without such innovation, conventional banking will continue to reinforce inequalities in financial access [13].

2.3. The role of informal financing in MSME ecosystems

In the absence of accessible formal credit, many MSMEs rely heavily on informal financing channels, which play a complex role in their ecosystems [9]. These include borrowing from family, friends, rotating savings groups, or local moneylenders [11]. While such mechanisms provide immediate liquidity, they rarely support long-term growth or sustainability [8].

Informal financing is attractive because it is flexible, accessible, and requires minimal documentation [12]. Entrepreneurs who lack credit histories or collateral often find these sources as their only viable option [10]. Rotating savings and credit associations, for example, have historically enabled small traders and artisans to pool resources and fund operations [7].

However, these benefits come with significant limitations. Informal credit is often insufficient for large investments, lacks legal protections, and may involve exploitative interest rates [13]. Dependence on such financing exposes MSMEs to cycles of debt that limit innovation and expansion [9].

Furthermore, reliance on informal networks perpetuates financial exclusion by keeping enterprises outside formal systems [12]. This reduces their opportunities to build credit histories or engage with larger supply chains. While informal financing will likely remain a vital fallback for MSMEs, it cannot substitute for systemic financial inclusion reforms that foster sustainability and scalability [8].

2.4. Why inclusive finance requires innovation and reform

Inclusive finance requires not only expanding credit but also innovating frameworks that address the unique realities of MSMEs [11]. Existing systems, rooted in conventional banking, are often too rigid and risk-averse to accommodate the diversity of small enterprises [13]. For financial inclusion to be meaningful, institutions must move beyond collateral-driven models and adopt approaches that leverage technology, alternative data, and tailored financial products [9].

Fintech innovations provide promising pathways. Mobile banking, blockchain, and AI-driven credit scoring have shown potential in democratizing access to finance for enterprises previously excluded [7]. These tools reduce transaction costs, expand geographic reach, and offer real-time credit assessments, aligning financial products more closely with MSME realities [12].

Reform also requires institutional shifts in risk perception. By embedding transparency, accountability, and adaptive mechanisms, financial institutions can better balance profitability with inclusion [10]. Public-private partnerships can further create ecosystems where innovative financial models scale sustainably [8].

Figure 1 presents a conceptual framework that illustrates the interconnected barriers facing MSMEs credit access gaps, institutional rigidities, and reliance on informal systems while mapping pathways toward inclusion through innovation and reform [13]. By embracing such reforms, financial systems can transition from exclusionary structures to inclusive enablers of MSME resilience and growth [9].

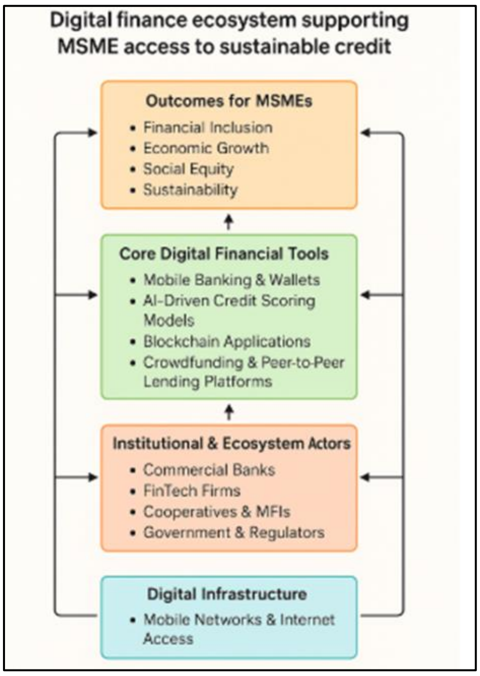

Figure 1 Conceptual framework of MSME financing barriers and pathways to inclusion

3. Inclusive financial technologies for msmes

3.1. Mobile banking, digital wallets, and financial apps (300 s)

Mobile banking, digital wallets, and financial apps have become transformative tools in improving MSMEs' access to financial services [14]. By leveraging mobile technology, these platforms overcome geographic barriers that traditionally excluded rural and peri-urban businesses from banking systems [12]. MSMEs can now transact, save, and borrow through handheld devices, bypassing costly and time-consuming visits to physical branches [15].

Digital wallets facilitate seamless payments between businesses and customers, creating transaction histories that serve as proxies for financial credibility [13]. For small enterprises, these transaction records can be critical in building creditworthiness and enabling future access to formal loans [16]. Additionally, financial apps integrate features such as expense tracking, cash-flow management, and micro-insurance, enhancing MSME resilience to market fluctuations [17].

The accessibility of mobile platforms also supports financial literacy. Applications that incorporate user-friendly dashboards, multilingual interfaces, and real-time notifications empower entrepreneurs to manage finances more effectively [14]. This reduces dependency on informal systems and enhances integration into formal financial ecosystems [12].

Despite these benefits, challenges persist. Connectivity gaps, high transaction fees, and regulatory uncertainties can limit widespread adoption [15]. Nonetheless, mobile banking and digital wallets remain pivotal innovations that significantly reduce structural barriers, offering MSMEs new pathways to participate in sustainable economic growth [13].

3.2. AI-driven credit scoring and alternative risk assessment models

AI-driven credit scoring introduces an innovative paradigm in evaluating MSME creditworthiness by moving beyond conventional collateral-based models [12]. Traditional systems heavily emphasize tangible assets and historical financial statements, often excluding small enterprises lacking formal records [16]. By contrast, AI integrates diverse datasets such as mobile money transactions, utility payments, and social media behavior to construct dynamic risk profiles [15].

These alternative models improve inclusion by recognizing the financial activities of enterprises that operate semi-formally [17]. For instance, machine learning algorithms can detect repayment capacity patterns from digital transaction histories, offering lenders a more nuanced understanding of MSME reliability [13]. This democratizes access to credit while maintaining risk management standards [14].

Furthermore, AI enhances efficiency by automating assessments, reducing costs, and accelerating approval timelines [12]. Lenders benefit from greater scalability, while entrepreneurs gain quicker access to working capital, enabling them to exploit emerging opportunities [16]. Transparency tools such as explainable AI techniques also allow borrowers and regulators to understand how credit decisions are made, addressing concerns about bias and opacity [15].

However, risks remain. Data privacy concerns, algorithmic bias, and the possibility of reinforcing existing inequalities highlight the importance of oversight and ethical safeguards [17]. Balancing innovation with accountability is crucial to ensure that AI-driven credit scoring promotes equitable outcomes rather than deepening financial divides [14].

3.3. Blockchain-enabled MSME financing and supply-chain finance

Blockchain technology offers powerful solutions to the financing challenges faced by MSMEs by enhancing transparency, reducing transaction costs, and enabling trust-based exchanges [13]. Decentralized ledgers provide immutable records of transactions, mitigating fraud and ensuring accountability across stakeholders [16]. For MSMEs, this is particularly valuable in supply-chain finance, where trust deficits often limit credit availability [14].

Smart contracts on blockchain platforms automate agreements between buyers, suppliers, and lenders, ensuring that payments and credit disbursements are executed once conditions are met [12]. This reduces delays, lowers transaction risks, and strengthens liquidity for small businesses [15]. Cross-border trade financing also benefits, as blockchain bypasses intermediaries, accelerating settlements and expanding MSMEs' access to global markets [17].

Additionally, blockchain-enabled platforms provide visibility into supply-chain activities. Lenders can verify production flows, delivery timelines, and payment histories, reducing risk perceptions associated with MSME lending [13]. This improved transparency fosters confidence and encourages formal institutions to extend financing.

Table 1 provides an overview of inclusive financial technologies including mobile platforms, AI models, and blockchain and their diverse applications in MSME contexts [14]. By mapping functionalities and use cases, the table underscores blockchain's unique potential to complement other digital innovations in creating sustainable financing ecosystems [16].

Nonetheless, blockchain adoption faces hurdles such as regulatory uncertainty, interoperability issues, and high implementation costs [12]. Without addressing these challenges, its potential for MSMEs may remain underutilized [15].

3.4. Opportunities and risks of digital divides

While digital innovations unlock unprecedented opportunities for MSME financing, they also risk reinforcing divides if access remains uneven [17]. Disparities in digital literacy, internet penetration, and affordability create structural inequalities, leaving marginalized entrepreneurs excluded from benefits [12]. In many rural regions, connectivity gaps and inadequate infrastructure limit adoption of mobile banking, AI-driven scoring, or blockchain platforms [13].

The digital divide also manifests in capacity gaps. Entrepreneurs lacking financial or technical knowledge may struggle to use advanced tools, while larger enterprises adapt more easily [16]. This asymmetry risks consolidating advantages for already established businesses, undermining the inclusive goals of digital finance [14].

At the same time, opportunities emerge when these divides are actively addressed. Policies that expand broadband infrastructure, promote affordable mobile data, and invest in digital literacy programs can bridge gaps and extend inclusion [15]. Partnerships between governments, fintech firms, and civil society are particularly vital in ensuring that technological benefits reach the smallest and most vulnerable enterprises [17].

Figure 2 illustrates a digital finance ecosystem that supports MSME access to sustainable credit, highlighting the interplay between mobile platforms, AI, and blockchain technologies [12]. The figure emphasizes how coordinated adoption can overcome divides by embedding inclusivity into design and implementation [14].

Ultimately, while digital innovations hold transformative potential, ensuring equitable access requires deliberate strategies. Without systemic efforts to address digital exclusion, technological solutions may inadvertently replicate or worsen existing inequalities [13]. The duality of opportunities and risks underscores why digital finance reforms must prioritize inclusivity alongside innovation [16].

Table 1 Overview of inclusive financial technologies and their MSME applications

Technology	**Core Features**	**MSME Applications**	**Opportunities**	**Challenges**
Mobile Banking & Digital Wallets	Mobile-based transactions, e-wallet storage, digital payments	Daily transactions, savings, access to micro-credit, record building	Expands outreach in rural/remote areas; improves transaction transparency	High transaction fees; limited internet and smartphone penetration
Financial Apps & Platforms	Expense tracking, cash-flow management, financial dashboards	Budgeting, expense management, micro-insurance integration	Improves financial literacy; real-time data for decision-making	Digital literacy gaps; regulatory uncertainties
AI-driven Credit Scoring	Uses alternative data (e.g., mobile money, utilities, e-commerce)	Risk assessment for unbanked or underbanked MSMEs	Reduces reliance on collateral; faster approvals; scalable	Algorithmic bias; data privacy concerns
Blockchain-based Finance	Decentralized ledgers, smart	Supply-chain finance, trade facilitation,	Enhances trust and security; reduces	High costs; lack of interoperability; regulatory uncertainty

	contracts, immutable records	transparent contracts	fraud; cross-border trade support	
Crowdfunding & Peer-to-Peer Lending	Digital platforms pooling individual investors	Capital for startups and small enterprises	Democratizes access to finance; builds community support	Investor protection issues; repayment risks
Digital Identity & e-KYC	Biometric IDs, digital verification, authentication	Streamlined onboarding, formal system entry for informal MSMEs	Reduces fraud, lowers compliance costs	Privacy risks; exclusion of digitally unregistered individuals

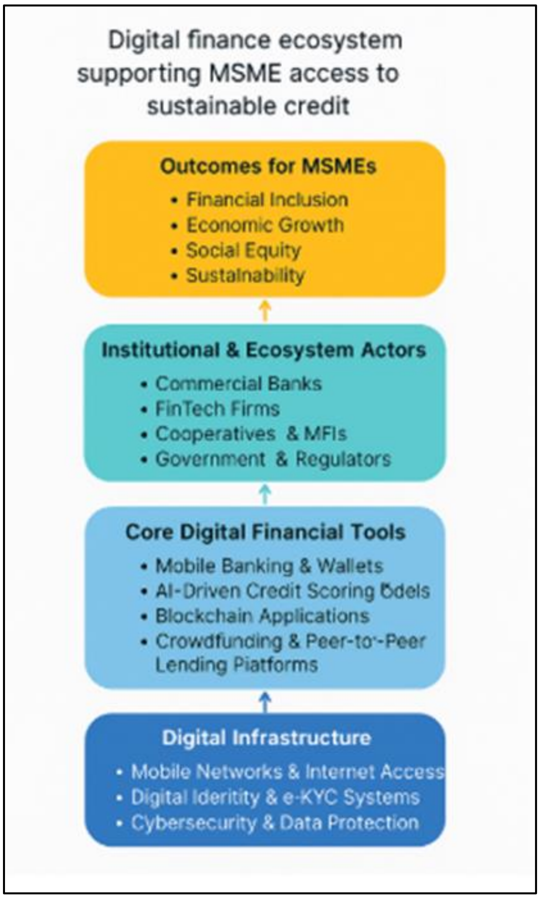

Figure 2 Digital finance ecosystem supporting MSME access to sustainable credit

4. Strategic collaborations for MSME growth

4.1. Public–private partnerships in MSME finance

Public–private partnerships (PPPs) have emerged as an essential mechanism for addressing MSME financing challenges by leveraging the comparative advantages of governments and private institutions [18]. Governments bring policy alignment, guarantees, and regulatory oversight, while private actors contribute innovation, efficiency, and capital [20]. Together, PPPs create hybrid financing ecosystems that balance inclusion with sustainability [23].

One notable strength of PPPs is their ability to de-risk MSME lending. Governments can provide partial credit guarantees that reduce perceived risks, encouraging private banks and fintech firms to extend financing [19]. Such mechanisms not only expand credit access but also reduce interest rates, making loans more affordable for entrepreneurs [17].

Additionally, PPPs facilitate infrastructure development. By collaborating with telecom operators and technology providers, governments can extend mobile banking platforms and digital services to rural and underserved regions [22]. This infrastructure enables broader adoption of fintech innovations that support MSME growth [24].

However, PPPs face challenges, particularly in aligning objectives across diverse stakeholders. While public institutions often prioritize inclusion, private firms may focus on profitability [21]. Ensuring sustainability requires strong governance frameworks that balance both objectives without diluting the mission of MSME support [20].

Ultimately, PPPs represent a powerful tool for fostering inclusive finance. When effectively structured, they not only mobilize resources but also catalyze systemic change, transforming MSME financing from a fragmented challenge into an integrated development strategy [23].

4.2. The role of development banks and microfinance institutions

Development banks and microfinance institutions (MFIs) play a pivotal role in bridging MSMEs' financing gaps, particularly in regions where commercial banks remain reluctant to engage [22]. Development banks typically operate with mandates that emphasize socio-economic development rather than profit maximization, allowing them to support high-risk enterprises [19]. By offering concessional lending and long-term financing, they enable MSMEs to pursue investment opportunities that traditional lenders would not support [23].

MFIs, by contrast, specialize in micro-loans designed for entrepreneurs at the lower end of the financing spectrum [20]. They employ community-based approaches, often relying on group lending models that minimize default risks through peer accountability [24]. This not only expands financial inclusion but also fosters social cohesion and entrepreneurship in underserved communities [18].

Both development banks and MFIs contribute to capacity building. Beyond lending, they provide training in financial literacy, business planning, and digital adoption, equipping MSMEs with skills necessary for sustainability [21]. These complementary services address structural weaknesses that limit enterprises' ability to thrive.

Nevertheless, challenges remain. MFIs sometimes impose high interest rates to cover operational costs, potentially burdening borrowers [17]. Development banks, on the other hand, may suffer from bureaucratic inefficiencies and political interference [22]. Despite these issues, their contributions to inclusive finance remain indispensable, particularly as they complement commercial banking by targeting market segments often excluded from traditional finance [23].

4.3. Corporate–MSME collaborations in value chains

Corporations and MSMEs increasingly engage in collaborative arrangements within value chains, fostering mutual benefits while addressing systemic barriers to finance [18]. Large firms gain from the flexibility, innovation, and localized insights of MSMEs, while smaller enterprises benefit from integration into structured supply chains that provide stability and credibility [20].

One of the most significant advantages of such collaborations lies in access to finance. MSMEs embedded in corporate supply chains often receive preferential access to credit, as their contracts with established firms reduce lenders' perception of risk [19]. Banks and fintech platforms are more willing to provide loans when repayment is linked to predictable cash flows from corporate partners [23].

These collaborations also enhance knowledge transfer. Corporations frequently offer training in quality standards, digital tools, and compliance, enabling MSMEs to build capacity [17]. This not only improves competitiveness but also aligns smaller enterprises with global market requirements [22]. For example, multinational corporations sourcing from local suppliers often invest in traceability systems that increase both efficiency and accountability [21].

Furthermore, corporate–MSME collaborations foster innovation. Smaller enterprises are often more agile, bringing niche solutions and creative approaches, while large corporations provide resources for scaling innovations [24]. This synergy can create competitive advantages across industries while promoting inclusive economic development [18].

Nonetheless, risks persist. Power imbalances may result in exploitative contracts where MSMEs assume disproportionate risks without adequate rewards [20]. Ensuring fair governance frameworks within value-chain collaborations is therefore essential for long-term sustainability [19]. Despite these challenges, such partnerships represent a vital strategy for strengthening MSME resilience, competitiveness, and access to finance within interconnected markets [23].

4.4. International cooperation and multilateral support mechanisms

International cooperation and multilateral mechanisms amplify the effectiveness of MSME support by fostering cross-border collaboration and resource mobilization [17]. Organizations such as the World Bank, International Finance Corporation (IFC), and regional development banks provide financial resources, technical expertise, and policy guidance that strengthen national ecosystems [22]. These interventions are particularly vital for countries where domestic financial systems lack sufficient capacity to support MSMEs [19].

Multilateral support extends beyond lending. Programs often include capacity-building initiatives, digital infrastructure development, and support for regulatory reforms that facilitate financial inclusion [21]. By harmonizing standards across regions, international cooperation also enables MSMEs to access broader markets, reducing barriers to cross-border trade [18].

Global partnerships further catalyze innovation. For example, donor-supported fintech accelerators provide platforms for startups to design inclusive financial solutions tailored to MSME needs [24]. Similarly, cross-country knowledge-sharing platforms disseminate best practices on credit guarantee schemes, blockchain-enabled financing, and AI-driven risk assessment [20].

Table 2 presents a comparative analysis of collaboration models for MSME support, highlighting the distinct contributions of PPPs, development banks, corporate partnerships, and multilateral mechanisms [23]. The table illustrates how these models complement one another, collectively addressing financing barriers through multi-dimensional strategies [17].

Despite these advantages, international cooperation faces challenges of coordination, overlapping mandates, and conditionalities tied to external funding [22]. Ensuring that such support aligns with local contexts and priorities remains critical [19]. Nevertheless, multilateral frameworks remain indispensable for scaling inclusive finance initiatives globally, particularly as MSMEs become increasingly integrated into international value chains [18].

Table 2 Comparative analysis of strategic collaboration models for MSME support

Collaboration Model	Key Actors	Core Features	MSME Benefits	Opportunities	Challenges
Public–Private Partnerships (PPPs)	Governments, commercial banks, fintechs, telecoms	Shared risk frameworks, infrastructure development, partial credit guarantees	Expanded credit access; lower borrowing costs; rural financial infrastructure	Mobilizes resources; scales innovation quickly	Conflicting priorities between public inclusion goals and private profit motives
Development Banks	National/regional development banks, donor agencies	Concessional lending, long-term financing, policy alignment	Access to affordable capital for investment; counter-cyclical support during crises	Encourages strategic sectors; aligns with national development agendas	Bureaucratic inefficiency; political influence in lending
Microfinance Institutions (MFIs)	Community-based organizations, NGOs, local banks	Group lending, peer accountability, micro-loans	Credit access for low-income and informal MSMEs	Builds community trust; empowers underserved groups	High interest rates; limited scalability for larger MSMEs

Corporate–MSME Value Chain Collaborations	Large corporations, MSME suppliers/distributors	Supply-chain integration, contract-based financing, capacity-building	Stable demand; easier access to credit linked to corporate contracts	Enhances innovation, knowledge transfer, and competitiveness	Risk of power imbalances and exploitative contracts
Multilateral Support Mechanisms	World Bank, IFC, regional development banks, UN agencies	Blended finance, technical assistance, cross-border policy harmonization	Access to international capital, knowledge-sharing, and trade networks	Strengthens resilience; expands regional/global markets	Coordination challenges; conditionalities tied to funding

5. Capacity-building for sustainable MSME development

5.1. Financial literacy and digital capability programs

Financial literacy and digital capability programs are foundational for strengthening MSME resilience and competitiveness [23]. Many small enterprises lack the knowledge to navigate formal financial systems, leading to underutilization of available services [27]. Programs that educate entrepreneurs on basic accounting, credit management, and savings practices enhance their ability to interact confidently with financial institutions [25].

Digital capability training complements financial literacy by equipping MSMEs with the skills to adopt mobile banking, e-commerce platforms, and digital payment systems [26]. As financial services increasingly migrate to online channels, businesses without digital fluency risk exclusion from critical markets [28]. By fostering digital skills, capacity-building initiatives reduce dependence on informal transactions and support broader integration into formal economies [24].

Practical examples include government-led workshops, fintech-driven online courses, and non-profit initiatives that focus on underserved regions [27]. These programs often combine classroom learning with experiential components, such as simulations of digital transactions, to build practical competence [23].

The impact of such interventions extends beyond individual enterprises. Financially literate MSMEs contribute to more stable financial ecosystems, reducing default rates and strengthening trust between lenders and borrowers [25]. As financial systems evolve, embedding literacy and digital training into national development strategies ensures that inclusion is not only achieved but sustained across diverse MSME ecosystems [26].

5.2. Entrepreneurial training and innovation hubs

Entrepreneurial training and innovation hubs have become vital tools in accelerating MSME growth and fostering sustainable business models [24]. These hubs serve as incubators where small enterprises access mentorship, shared resources, and technical expertise that would otherwise be unaffordable [28]. They also create collaborative environments where entrepreneurs exchange knowledge, sparking innovation and resilience [23].

Training programs within hubs emphasize skills such as business planning, market analysis, and product development [26]. Entrepreneurs gain practical insights into scaling operations, accessing funding, and complying with regulatory frameworks [25]. Such structured training is critical in environments where informal business practices dominate, often limiting long-term growth prospects [27].

Innovation hubs also provide access to digital infrastructure, including co-working spaces, internet connectivity, and prototyping labs [24]. These resources allow MSMEs to experiment, test products, and integrate technology into their operations. Partnerships between hubs and universities further strengthen research and development linkages, aligning academic expertise with entrepreneurial needs [28].

Importantly, hubs act as bridges between MSMEs and potential investors. By showcasing scalable projects, they help enterprises attract funding, reducing dependency on informal financing [23]. Beyond financial benefits, hubs cultivate entrepreneurial mindsets that embrace adaptability, creativity, and risk management [26].

By institutionalizing entrepreneurial training and fostering innovation ecosystems, these hubs address capacity gaps that limit MSME competitiveness. They represent scalable models for promoting sustainable enterprise development in both developed and emerging economies [27].

5.3. Gender-inclusive capacity-building strategies

Women-led MSMEs often face compounded challenges, including limited access to finance, sociocultural barriers, and restricted networks [25]. Gender-inclusive capacity-building strategies are therefore essential for creating equitable opportunities [28]. These approaches aim to dismantle systemic biases while equipping women entrepreneurs with the skills, knowledge, and confidence to thrive [23].

Tailored financial literacy programs specifically address the realities of women-led enterprises, recognizing the additional barriers they encounter in negotiating loans or leveraging digital tools [27]. Training often includes modules on leadership, negotiation, and digital adoption, designed to enhance both technical and strategic capacity [26].

Gender-sensitive initiatives also integrate supportive ecosystems. For example, women-focused business associations and cooperatives create solidarity networks that amplify voices often excluded from mainstream platforms [24]. These networks also improve bargaining power, enabling collective engagement with financial institutions and policymakers [25].

Policy interventions reinforce these strategies. Governments and NGOs increasingly mandate quotas or incentives for women's participation in training and financing schemes, promoting inclusivity at institutional levels [28]. By embedding gender considerations into capacity-building, initiatives not only support women entrepreneurs but also enhance economic growth, as evidence shows that women reinvest significantly into communities [23].

Ultimately, gender-inclusive strategies recognize that equitable participation is not automatically achieved through generic interventions [27]. They require deliberate, context-sensitive measures that reduce disparities and unlock the potential of women-led MSMEs [26]. Such efforts create more resilient and diverse entrepreneurial ecosystems that benefit broader societies [24].

5.4. Institutionalizing mentorship and knowledge-sharing platforms

Mentorship and knowledge-sharing platforms are critical for sustaining long-term MSME growth [24]. Experienced professionals provide guidance that accelerates learning curves, helping entrepreneurs avoid common pitfalls in finance, management, and digital adoption [25]. Unlike one-off training sessions, mentorship creates sustained relationships that adapt to the evolving needs of enterprises [23].

Institutionalizing such mentorship ensures that knowledge transfer is systematic rather than sporadic [28]. National business associations, universities, and chambers of commerce can formalize mentor networks, matching experienced professionals with emerging entrepreneurs [27]. These platforms promote peer-to-peer learning, where successful MSMEs share best practices with others in their ecosystems [26].

Digital platforms extend the reach of mentorship, connecting entrepreneurs with global experts. Online forums, webinars, and AI-powered advisory tools enable real-time problem-solving, democratizing access to knowledge [25]. These innovations are particularly valuable for enterprises in remote areas with limited exposure to professional networks [24].

Figure 3 illustrates the capacity-building ecosystem linking MSMEs, institutions, and innovation platforms, highlighting how mentorship and knowledge-sharing fit into broader strategies for sustainable growth [23]. The figure underscores the interdependencies between training, institutional support, and digital infrastructure [26].

Institutionalizing mentorship is not without challenges, as sustaining volunteer engagement and ensuring quality standards require strong frameworks [27]. However, when effectively structured, mentorship and knowledge-sharing become transformative, building resilient entrepreneurial communities that continuously adapt to changing economic landscapes [28].

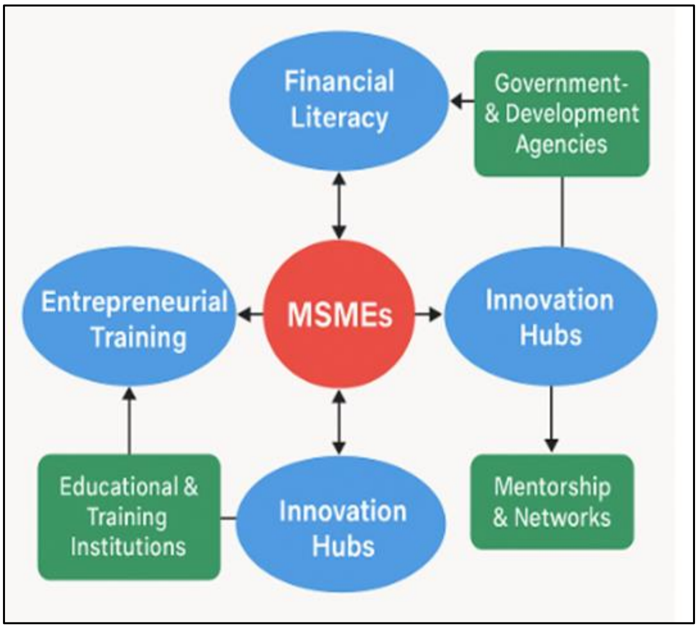

Figure 3 Capacity-building ecosystem linking MSMEs, institutions, and innovation platforms

6. Sustainability dimensions in MSME finance

6.1. Linking MSME financing to SDGs and climate goals

Micro, small, and medium-sized enterprises (MSMEs) are increasingly recognized as pivotal actors in achieving the Sustainable Development Goals (SDGs), particularly in the domains of poverty alleviation, decent work, and climate action [28]. Their localized nature enables them to implement sustainable practices that directly impact communities, such as adopting renewable energy solutions, reducing waste, or enhancing resource efficiency [30]. By aligning financing mechanisms with the SDGs, MSMEs can serve as engines of inclusive and green growth [31].

Access to sustainable finance is central to this alignment. Financing models that integrate environmental and social considerations encourage MSMEs to adopt eco-friendly production processes [27]. For example, concessional loans or blended finance models incentivize enterprises to invest in cleaner technologies that reduce emissions and improve competitiveness [29]. In addition, capacity-building programs linked to finance strengthen the ability of small businesses to integrate sustainability into operations [32].

The broader link between MSME financing and global climate goals lies in their potential to collectively reduce carbon footprints across economies [33]. When supported by innovative financial tools, MSMEs can accelerate transitions to low-carbon production and consumption systems [28]. Thus, embedding SDG principles into MSME financing is not only a developmental imperative but also a strategic pathway for addressing global climate challenges [31].

6.2. ESG frameworks and MSME lending

Environmental, social, and governance (ESG) frameworks have gained prominence as guiding principles for responsible finance, shaping how capital is allocated across sectors [30]. Integrating ESG into MSME lending ensures that financial flows promote ethical and sustainable business practices [32]. For small enterprises, this alignment helps access capital while simultaneously reinforcing long-term sustainability [28].

In practice, ESG-based lending criteria encourage MSMEs to comply with standards such as reducing carbon emissions, fostering workplace diversity, or improving governance structures [27]. Lenders apply ESG scoring systems that assess environmental and social risks, allowing them to differentiate between enterprises that align with sustainability principles and those that do not [31]. This provides both risk mitigation for financial institutions and growth opportunities for MSMEs [29].

Furthermore, ESG integration facilitates reputational benefits. MSMEs that adhere to ESG principles often gain competitive advantages by attracting environmentally conscious investors, consumers, and supply-chain partners [30]. This reputational capital not only increases market opportunities but also drives accountability in operations [33].

However, challenges exist in operationalizing ESG frameworks for small enterprises. Limited resources and technical expertise often hinder compliance with reporting and monitoring requirements [28]. Simplified ESG tools, coupled with capacity-building support, are therefore critical for ensuring that MSMEs benefit rather than face exclusion from sustainability-driven finance [32]. Ultimately, ESG-aligned MSME lending reinforces a dual objective: enhancing financial access while advancing inclusive and sustainable development [27].

6.3. Green finance instruments for MSMEs

Green finance instruments provide MSMEs with targeted opportunities to integrate environmental sustainability into their operations [29]. Instruments such as green bonds, climate funds, and sustainability-linked loans are designed to channel capital toward projects that deliver measurable environmental benefits [32]. For small enterprises, these mechanisms reduce the cost of transitioning to sustainable practices while opening access to new markets [27].

Green bonds, for instance, allow MSMEs to raise funds for renewable energy adoption, energy-efficient machinery, or sustainable agriculture [31]. Though traditionally used by larger corporations, innovative aggregation models now enable MSMEs to collectively issue bonds through cooperatives or development banks [28]. Similarly, sustainability-linked loans offer interest rate reductions for enterprises that meet pre-defined environmental targets [33]. These incentives directly link financing to performance, encouraging continuous improvement [30].

Microfinance institutions and fintech platforms are also experimenting with green lending products, embedding climate-related criteria into their risk assessments [29]. Such innovations expand financing access for rural and informal enterprises, where green investments often yield significant community benefits [32].

Despite these opportunities, adoption remains limited due to information asymmetries, regulatory uncertainty, and high upfront costs [27]. Addressing these barriers requires stronger policy frameworks, technical assistance, and blended finance initiatives that lower entry thresholds. With such support, green finance instruments can transform MSMEs into leaders of local climate action [28].

6.4. Long-term resilience through sustainable financial systems

Building long-term resilience requires embedding sustainability principles across entire financial systems, ensuring that MSME financing supports both economic and environmental stability [30]. Resilient systems are characterized by adaptability, transparency, and inclusivity, enabling enterprises to withstand shocks while pursuing sustainable growth [27].

One key aspect of resilience is institutionalizing sustainability-linked finance within mainstream banking. By normalizing green credit lines, ESG reporting, and concessional instruments, financial institutions can shift MSME financing toward practices that balance profitability with environmental responsibility [28]. Such systemic integration ensures that sustainability becomes a default rather than an exception [31].

Collaborative platforms also enhance resilience. Partnerships between governments, multilateral agencies, and private sector actors create financing ecosystems where risk is shared, and sustainability outcomes are prioritized [32]. For instance, blended finance models de-risk green investments while crowding in private capital for MSME projects [33].

Table 3 maps MSME financing strategies to sustainability dimensions, demonstrating how tools such as ESG frameworks, green bonds, and concessional lending align with environmental, social, and governance objectives [29]. The table underscores the interconnectedness of strategies required to sustain long-term resilience [27].

Finally, resilience depends on continuous learning. Feedback loops, capacity-building programs, and policy reforms ensure that MSMEs evolve alongside shifting climate and market realities [30]. By institutionalizing these processes, financial systems can not only safeguard enterprises against risks but also empower them to contribute actively to global sustainability transitions [28].

Table 3 Mapping MSME financing strategies to sustainability dimensions

Financing Strategy	Sustainability Dimension	Applications for MSMEs	Opportunities	Challenges
ESG-Aligned Lending	Environmental, Social, Governance	Credit linked to ESG performance (e.g., carbon reduction, fair labor practices, transparent governance)	Enhances credibility with investors and consumers; drives ethical business practices	High reporting burdens; lack of standardized metrics for MSMEs
Green Bonds & Climate Funds	Environmental	Financing for renewable energy adoption, waste reduction, eco-friendly production	Promotes low-carbon transitions; access to new sustainability-linked markets	High entry costs; limited aggregation models for small enterprises
Sustainability-Linked Loans (SLLs)	Environmental & Governance	Loan terms tied to meeting predefined sustainability targets (e.g., energy efficiency)	Provides financial incentives for adopting greener practices	Monitoring and verification complexities
Blended Finance & Credit Guarantees	Social & Governance	Public–private risk-sharing models supporting inclusive MSME credit access	Reduces lender risk; expands access for high-risk or underserved enterprises	Potential moral hazard; sustainability impact depends on oversight
Cooperative & Community Finance	Social	Collective savings, micro-credit schemes, community reinvestment	Builds local resilience; promotes equitable distribution of benefits	Limited scalability; governance vulnerabilities in some contexts
Digital & Alternative Financing Models	Cross-cutting (Environmental, Social, Governance)	AI-driven credit scoring, blockchain-enabled finance, mobile platforms	Expands reach; integrates transparency; facilitates climate-smart investments	Risk of digital divides; data privacy and cybersecurity concerns

7. Regional case studies of inclusive MSME growth

7.1. Africa: mobile money and digital credit ecosystems

Africa has pioneered mobile money ecosystems that have revolutionized financial access for MSMEs [34]. Platforms such as M-Pesa in Kenya and MTN Mobile Money in West Africa have demonstrated how mobile-based solutions can bypass traditional banking limitations [36]. These services enable entrepreneurs to conduct transactions, save securely, and build digital records that can be leveraged for credit [33].

Digital credit products linked to mobile wallets provide MSMEs with short-term working capital, often disbursed within minutes [35]. Such innovations reduce reliance on informal lenders while offering greater transparency in repayment structures [37]. For many small businesses operating in rural or semi-formal markets, these ecosystems represent the first bridge into formal financial systems [36].

However, challenges remain. High transaction fees, digital fraud, and inconsistent regulation across countries risk undermining trust in mobile money [34]. Furthermore, over-reliance on short-term digital credit can expose MSMEs to cycles of debt if not managed responsibly [33]. Despite these risks, Africa’s experience illustrates how mobile-based ecosystems can transform MSME financing, setting benchmarks for other regions [35].

7.2. Asia: FinTech innovation and SME support ecosystems

Asia has emerged as a global hub of FinTech innovation, with countries such as China, India, and Singapore leading in digital finance adoption [37]. For MSMEs, this innovation has resulted in diverse financing tools, from peer-to-peer lending platforms to AI-driven credit scoring systems [33]. These solutions address structural gaps left by traditional banks, particularly in economies with vast informal sectors [35].

In India, initiatives like UPI (Unified Payments Interface) have accelerated digital payments and strengthened financial ecosystems for small businesses [34]. Similarly, Chinese FinTech giants leverage big data to extend credit to MSMEs excluded from conventional banking [36]. Governments in Asia also play an active role, providing policy support and digital infrastructure that fosters FinTech growth [37].

Innovation hubs and incubators across the region further support MSMEs by integrating training, mentorship, and access to digital finance [35]. These ecosystems combine financial inclusion with entrepreneurial capacity-building, ensuring that small businesses can scale sustainably [33].

Despite this progress, risks such as cybersecurity vulnerabilities, regulatory fragmentation, and unequal access to technology persist [34]. Nonetheless, Asia's FinTech-driven support ecosystems provide powerful models for aligning technology and inclusion in MSME finance [36].

7.3. Latin America: cooperative banking and MSME inclusion

Latin America's MSME finance landscape is characterized by the strong presence of cooperative banking models that complement traditional financial institutions [35]. Cooperative banks, rooted in community ownership, provide MSMEs with accessible credit while reinvesting profits locally [33]. Their participatory structures align closely with the needs of small enterprises, particularly in rural regions [36].

These institutions often bundle financial products with capacity-building initiatives, offering training in digital literacy, business planning, and compliance [34]. By reducing dependence on collateral and emphasizing trust-based lending, cooperatives address systemic barriers faced by MSMEs in accessing credit [37]. Moreover, they play a stabilizing role during economic volatility, sustaining local economies when commercial banks withdraw [35].

At the regional level, cooperative banking fosters financial inclusion by prioritizing social objectives alongside profitability [33]. This balance enhances resilience and strengthens community-based financial ecosystems. Figure 4 illustrates the comparative regional landscape of inclusive MSME financial ecosystems, highlighting Latin America's cooperative models as distinct from mobile-centric African systems or technology-driven Asian ecosystems [36].

Nonetheless, challenges remain, including limited digital adoption and governance weaknesses in some cooperative institutions [34]. Yet, the regional experience underscores the value of cooperative finance as a pathway to inclusive and sustainable MSME development [37].

7.4. Europe: policy frameworks and sustainable MSME finance

Europe's approach to MSME finance is defined by robust policy frameworks that integrate sustainability and inclusivity into financial systems [36]. Institutions such as the European Investment Bank and European Bank for Reconstruction and Development provide targeted credit lines and guarantees to support MSMEs across member states [33]. These frameworks are reinforced by EU policies that prioritize digital adoption, ESG compliance, and innovation-driven growth [35].

Policy tools such as credit guarantee schemes and structural funds reduce financing risks, making MSME lending more attractive to commercial banks [34]. Additionally, Europe has pioneered green finance initiatives that align MSME credit with broader climate and sustainability objectives [37]. These measures position MSMEs as contributors to both economic competitiveness and environmental resilience [36].

Capacity-building is another cornerstone of Europe's strategy. Through training programs, digital platforms, and cross-border cooperation, MSMEs gain access not only to financing but also to the skills and networks necessary for long-term success [33].

Despite these strengths, challenges persist in ensuring equal access across member states, particularly between advanced economies and less-developed regions [35]. Nevertheless, Europe's structured, policy-driven model highlights how institutional frameworks can embed inclusivity and sustainability into MSME finance at scale [34].

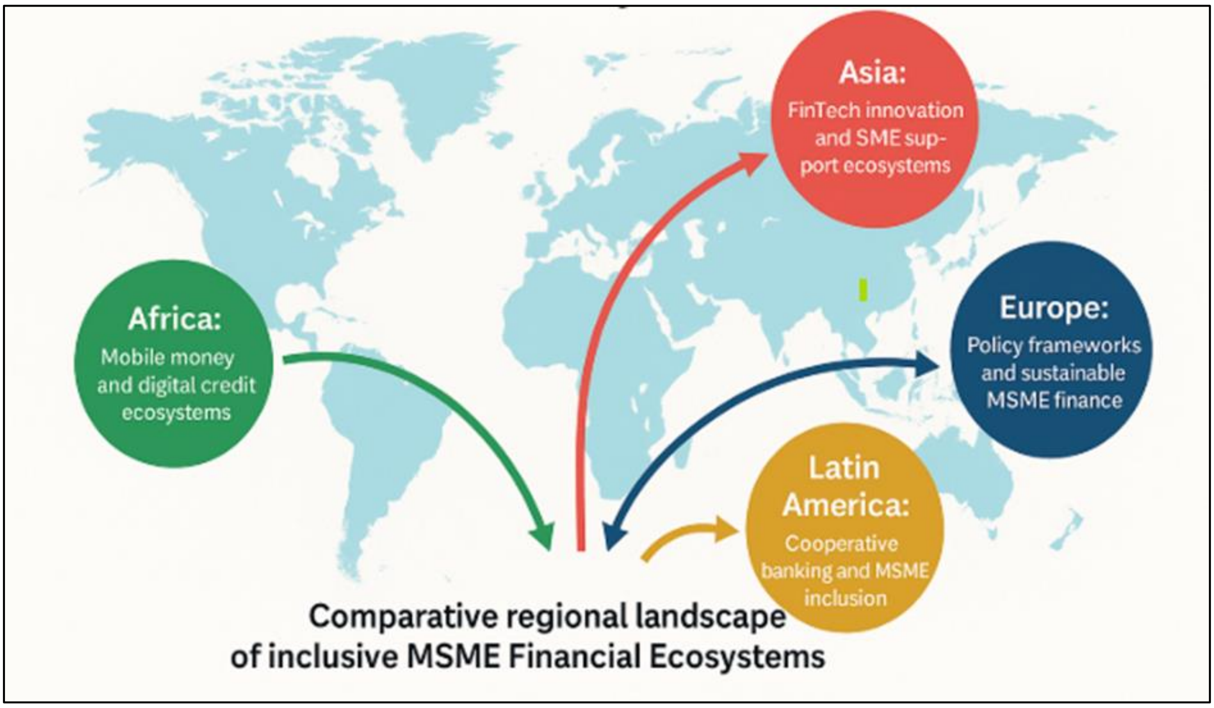

Figure 4 Comparative regional landscape of inclusive MSME financial ecosystems [22]

8. Policy and governance implications

8.1. National financial inclusion strategies

National financial inclusion strategies (NFIS) provide governments with a structured framework to expand access to credit and financial services for MSMEs [39]. These strategies integrate policy priorities with implementation plans that address barriers such as lack of infrastructure, weak regulatory capacity, and low financial literacy [41]. For MSMEs, NFIS often translate into targeted programs that link digital finance with capacity-building [38].

Countries implementing NFIS typically adopt multi-stakeholder approaches, involving central banks, commercial banks, fintech firms, and civil society [40]. Such collaboration ensures that financial inclusion is not treated as a narrow policy but as a holistic development agenda [42]. For instance, some governments incorporate MSME-specific credit guarantee schemes into national strategies, enabling risk-sharing and expanding lending [39].

Importantly, NFIS often embed monitoring mechanisms that evaluate progress against measurable targets [41]. This fosters accountability while aligning with broader economic and sustainability objectives [38].

While challenges such as fragmented implementation and underfunding persist [42], NFIS remain crucial tools. By coordinating stakeholders, reducing duplication, and focusing on vulnerable groups, they ensure that MSME financing is both inclusive and sustainable [40]. Ultimately, national strategies serve as the cornerstone of systemic reform, positioning MSMEs as catalysts for economic growth [39].

8.2. Regulatory frameworks for digital finance

Regulatory frameworks are essential in ensuring that digital finance contributes to inclusive growth rather than exacerbating inequalities [41]. For MSMEs, regulation provides both protection and stability, fostering confidence in digital tools such as mobile banking, e-wallets, and blockchain platforms [38]. Without effective frameworks, risks such as cybercrime, predatory lending, and data misuse can undermine trust in financial systems [40].

Progressive frameworks typically address issues of interoperability, consumer protection, and data privacy [39]. For instance, regulations mandating transparent digital lending practices prevent exploitative interest rates that might otherwise trap MSMEs in cycles of debt [42]. Similarly, digital identity systems regulated by central authorities improve verification processes, enabling broader participation in digital finance [41].

Cross-border frameworks are also increasingly important. Regional harmonization of standards facilitates MSME participation in digital trade and reduces compliance costs for enterprises seeking to expand internationally [40].

Nonetheless, striking the right balance remains a challenge. Over-regulation risks stifling innovation, while under-regulation exposes MSMEs to systemic vulnerabilities [38]. Therefore, regulatory agility allowing policies to evolve with technological progress is essential [39]. When designed inclusively, regulatory frameworks not only mitigate risks but also enhance trust, accelerating MSME integration into digital financial ecosystems [42].

8.3. Risk-sharing mechanisms and credit guarantees

Risk-sharing mechanisms, particularly credit guarantee schemes, play a critical role in bridging financing gaps for MSMEs [40]. By absorbing part of the default risk, guarantees incentivize financial institutions to extend credit to enterprises that might otherwise be excluded [39]. This reduces collateral requirements and encourages lending based on potential rather than historical financial records [42].

Guarantee schemes are often funded or backed by governments, development banks, or international agencies [41]. For MSMEs, these arrangements lower the barriers to obtaining affordable loans, while for lenders they reduce the perceived risk of default [38]. Such mechanisms are especially effective in high-risk environments, including post-crisis economies where MSMEs face acute liquidity challenges [40].

Beyond guarantees, blended finance instruments also distribute risks by combining concessional public funds with private investment [39]. This approach not only expands financing but also fosters partnerships between public and private actors, aligning incentives across the ecosystem [42].

However, the sustainability of risk-sharing mechanisms depends on effective governance. Poorly designed schemes can create moral hazard, encouraging reckless lending or borrower complacency [41]. Ensuring transparency, accountability, and robust monitoring is therefore vital. When structured responsibly, risk-sharing mechanisms provide scalable solutions for inclusive MSME financing [38].

8.4. Building institutional trust in MSME finance

Institutional trust forms the foundation of sustainable MSME financing systems [42]. Entrepreneurs are more likely to engage with formal institutions when they believe processes are transparent, fair, and responsive to their needs [39]. Trust reduces reliance on informal lenders and strengthens the link between financial inclusion and long-term resilience [38].

Building trust requires consistent service delivery and accountability. Financial institutions that provide clear terms, fair interest rates, and responsive dispute-resolution mechanisms foster confidence among MSMEs [41]. Transparency in digital platforms, including explainable algorithms for credit scoring, further reduces suspicion and enhances adoption [40].

Partnerships also reinforce trust. Collaboration between governments, private institutions, and civil society organizations creates inclusive ecosystems where MSMEs feel supported rather than exploited [42]. National awareness campaigns and literacy programs play a complementary role, ensuring entrepreneurs understand their rights and responsibilities in financial systems [38].

At the systemic level, trust is bolstered when regulatory bodies enforce consumer protections and deter malpractice [39]. By embedding these safeguards, institutions demonstrate reliability, encouraging MSMEs to participate more fully in financial markets [41]. Ultimately, building institutional trust transforms finance from a transactional relationship into a foundation for sustainable growth and empowerment [40].

9. Future directions and research opportunities

9.1. Emerging financial technologies for MSMEs

Emerging financial technologies are reshaping how MSMEs access, manage, and sustain financing [42]. Tools such as decentralized finance (DeFi), tokenized assets, and AI-driven lending platforms are reducing transaction costs while expanding reach into underserved markets [43]. For instance, blockchain-based platforms enhance transparency and trust by enabling immutable credit histories for small firms with limited documentation [41]. Similarly, digital crowdfunding ecosystems democratize investment, allowing entrepreneurs to tap into broader pools of capital [44].

These innovations also integrate sustainability by aligning lending with environmental and social metrics, ensuring growth that is both inclusive and responsible [45]. Despite concerns regarding regulation and digital divides, the momentum of fintech demonstrates its potential to fundamentally transform MSME financial inclusion [42].

9.2. Leveraging data ecosystems for inclusive growth

Data ecosystems are central to unlocking inclusive growth for MSMEs [43]. By integrating financial, transactional, and behavioral data, institutions can design more accurate credit risk models that reduce dependence on collateral [41]. Alternative data, such as mobile payment histories and e-commerce sales, provide lenders with actionable insights into small enterprises' performance [44].

Governments and fintech companies increasingly recognize the value of open-data initiatives that create interoperable platforms for MSME financing [42]. These ecosystems allow enterprises to build digital identities, which not only expand financial access but also reduce fraud and transaction inefficiencies [45]. However, issues of privacy, governance, and equitable access to data must be addressed to ensure inclusivity [43]. When managed responsibly, data ecosystems become powerful enablers of MSME resilience [41].

9.3. Strengthening multilateral collaboration for MSME finance

Multilateral collaboration remains a cornerstone of scaling MSME financing globally [42]. International organizations such as the World Bank, IMF, and regional development banks provide financial resources, policy support, and technical expertise that complement domestic initiatives [44]. Collaborative platforms facilitate knowledge exchange on credit guarantee systems, digital infrastructure, and regulatory harmonization [41].

Furthermore, multilateral actors help de-risk private sector investments by offering blended finance structures that encourage capital flows into MSMEs [45]. Cross-border cooperation also enhances market access for small enterprises, enabling them to integrate into global value chains [43]. Challenges remain, including coordination gaps and conditionalities tied to external funding [42]. Nevertheless, strengthening multilateral partnerships is indispensable for building sustainable and inclusive MSME finance ecosystems [44].

9.4. Open research gaps in sustainable MSME financing

Despite significant advances, key research gaps remain in sustainable MSME financing [41]. First, limited evidence exists on the long-term impacts of fintech solutions on enterprise resilience and poverty reduction [43]. Studies often focus on adoption rates rather than evaluating outcomes such as employment creation, gender equity, or environmental benefits [42].

Second, the role of hybrid finance models blending digital platforms with cooperative structures remains underexplored [44]. More research is also needed on how to design policies that balance innovation with regulation, particularly in contexts of weak governance [45]. Finally, the intersection of green finance and MSME development is an emerging area with little empirical data [41]. Addressing these gaps is critical for ensuring that inclusive finance strategies translate into measurable and sustainable outcomes [43].

10. Conclusion

10.1. Recap of findings

This article has explored the multifaceted relationship between MSMEs and financial ecosystems, tracing both persistent barriers and transformative opportunities. It established that MSMEs are fundamental contributors to global and local economies, generating employment, driving innovation, and fostering inclusive growth. Despite their importance, the sector faces entrenched financing challenges, including credit access gaps, rigid banking criteria, and over-reliance on informal systems. These challenges often translate into limited scalability and vulnerability to shocks.

In response, a wide range of innovative financial solutions have emerged. Digital platforms, AI-driven credit scoring, blockchain-enabled supply-chain finance, and gender-inclusive training strategies were shown to expand the reach of formal finance. Cooperative and multilateral mechanisms, including development banks, microfinance institutions, and international partnerships, provide critical complementary roles. The analysis also emphasized the alignment of MSME financing with sustainability agendas, such as the SDGs, ESG frameworks, and green finance instruments. Collectively, these findings illustrate the necessity of rethinking traditional models and embracing integrated, technology-enabled, and sustainable financial systems for MSMEs.

10.2. Implications for MSME stakeholders

For stakeholders, the findings carry significant implications. Governments must continue to play a central role in building enabling environments through national financial inclusion strategies, regulatory reforms, and infrastructure investments. By fostering trust and promoting inclusive policies, they can ensure that MSMEs remain active participants in formal economies. Financial institutions, including commercial banks and fintech companies, must adapt their models to better serve smaller enterprises. This requires a shift from rigid, collateral-based lending toward innovative risk assessments that leverage alternative data and digital tools.

Development banks, microfinance institutions, and cooperatives remain essential in bridging gaps for underserved communities. Their focus on inclusion and local development aligns with the broader agenda of resilience and equity. For international actors, such as multilateral agencies, there is a clear mandate to continue mobilizing resources and facilitating knowledge-sharing platforms. Finally, MSMEs themselves must actively invest in financial literacy, digital adoption, and sustainability practices. By engaging with emerging tools and building institutional trust, they can strengthen their competitiveness and resilience in rapidly evolving markets.

10.3. Final reflections on inclusive and sustainable MSME ecosystems

Inclusive and sustainable MSME ecosystems represent both a development priority and a moral imperative. The future of financial systems lies not in replicating exclusionary models but in embedding transparency, accessibility, and sustainability into every stage of financing. Achieving this requires deliberate efforts to bridge digital divides, reduce gender disparities, and align finance with climate and social goals. By doing so, MSME ecosystems can evolve into powerful engines of equitable growth that support both local communities and global sustainability agendas.

At the heart of this transformation is trust. Building financial systems that entrepreneurs believe in and can access without fear of exploitation will determine whether inclusive finance achieves its promise. The task is complex, requiring cooperation across governments, institutions, and technology providers. Yet the opportunities outweigh the challenges. With innovation, collaboration, and sustainability as guiding principles, MSMEs can transcend historical barriers and emerge as central drivers of resilient, inclusive, and future-ready economies worldwide.

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