

Breaking Barriers: Digital Transformation and Financial Inclusion for Women-Led Small and Medium Enterprises (SMEs) in Emerging Economies

Nikhath Praween¹; Om Prakash Mehta¹

¹Sai Nath University, Ranchi, Jharkhand, India

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Abstract: Women entrepreneurs in emerging economies face systemic challenges in scaling their Small and Medium Enterprises (SMEs), including limited access to finance, digital illiteracy, and socio-cultural constraints. Despite contributing significantly to economic growth and employment, women-led SMEs remain underserved by traditional financial systems and technological advancements. This study explores the dual role of digital transformation (e-commerce, mobile banking, AI-driven tools) and financial inclusion (fintech, microfinance, government schemes) in bridging these gaps. Using a mixed-methods approach—combining case studies from India, Nigeria, and Bangladesh with macro-level data analysis—the paper identifies key barriers and innovative solutions empowering women entrepreneurs. The findings highlight how digital platforms can reduce gender disparities in SME growth while proposing policy recommendations to enhance accessibility, training, and institutional support. By linking technology, gender, and development economics, this research contributes to the broader discourse on inclusive growth and sustainable development in emerging markets.

Keywords: Women Entrepreneurship, SMEs, Digital Transformation, Financial Inclusion, Emerging Economies, Gender Gap.

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I. INTRODUCTION

Small and Medium Enterprises (SMEs) are fundamental to job creation, poverty alleviation, and economic diversification in emerging economies. Within this sector, women-led SMEs represent an untapped source of economic growth and innovation. Yet, these enterprises often face disproportionately higher barriers compared to their male-led counterparts. These include limited access to formal credit, inadequate financial literacy, lack of digital skills, regulatory bottlenecks, and socio-cultural norms that inhibit entrepreneurial freedom [1][2]. Despite their contributions to employment and GDP, women entrepreneurs remain significantly underrepresented in policy dialogues and underserved by both traditional financial institutions and modern digital infrastructure [3].

The increasing penetration of digital technologies and mobile platforms has introduced transformative tools that can redefine the operational landscape of SMEs. Digital transformation—encompassing mobile banking, e-commerce, cloud accounting, artificial intelligence (AI), and blockchain—has lowered market entry barriers, enabled broader customer reach, and enhanced operational efficiency

[4]. Concurrently, financial inclusion mechanisms such as mobile wallets, peer-to-peer lending, microfinance institutions, and government-sponsored credit guarantee schemes are addressing long-standing gaps in capital access, particularly for women who lack collateral or formal credit histories [5][6].

Despite the promise of these tools, the impact of digital transformation and financial inclusion on women-led SMEs in emerging economies remains understudied. Existing research tends to treat digitalization and financial inclusion as parallel trends rather than interconnected levers of inclusive entrepreneurship. There is a pressing need to explore how these dual forces interact, overlap, and reinforce one another in shaping opportunities for women entrepreneurs in developing contexts [7].

This paper addresses that gap by examining how digital technologies and inclusive financial systems can collectively empower women entrepreneurs. It focuses on three representative emerging economies—India, Nigeria, and Bangladesh—where the potential of women-led SMEs is high, yet systemic constraints persist. Using a mixed-methods approach, the study analyzes macroeconomic datasets

alongside in-depth case studies to uncover both structural challenges and successful interventions.

The research makes the case that empowering women through targeted digital and financial inclusion strategies is not only a matter of gender equity but also an economic imperative. It aligns with multiple Sustainable Development Goals (SDGs), notably SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure), by presenting a model where inclusive growth and technological advancement coalesce [8]. The key contributions of this paper includes:

- **Multi-country Comparative Analysis:** This paper provides one of the few cross-country assessments of women-led SMEs in emerging markets, focusing on India, Nigeria, and Bangladesh—three economies with significant but under-supported female entrepreneurship ecosystems (World Bank, 2021).

- **Integrated Framework:** It proposes a dual-lens framework combining digital transformation and financial inclusion to examine their collective impact on reducing gender gaps in SME development.
- **Barriers and Enablers:** The study identifies systemic barriers—such as digital illiteracy, limited collateral, and socio-cultural restrictions—and showcases successful models that have enabled women entrepreneurs to overcome these challenges.
- **Policy Recommendations:** Based on empirical evidence, it offers actionable policy interventions focused on expanding digital infrastructure, enhancing financial literacy, and enabling public-private partnerships for inclusive financing.
- **Contribution to Gendered Development Economics:** By aligning the research with Sustainable Development Goals (SDGs 5, 8, and 9), the paper strengthens the discourse on gender equity and inclusive economic development through digital-financial synergies.

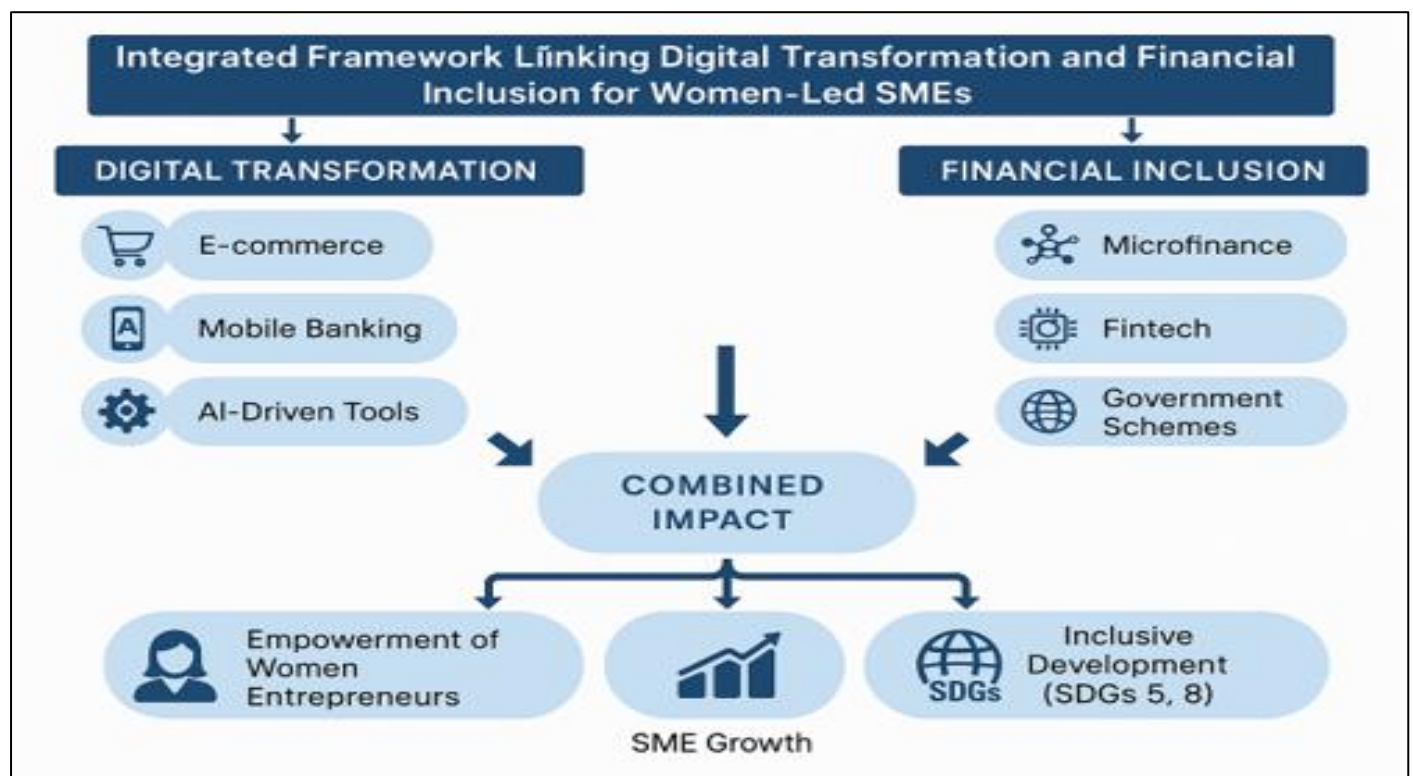


Fig 1 Integrated Framework Linking Digital Transformation and Financial Inclusion for Women-Led SMEs

II. LITERATURE SURVEY

Women-led Small and Medium Enterprises (SMEs) in emerging economies are increasingly acknowledged as engines of inclusive growth, yet they continue to encounter structural obstacles—chief among them are limited access to financial services, inadequate digital infrastructure, and entrenched gender norms. While digital transformation and financial inclusion have each been widely studied, their intersection—especially as it relates to women entrepreneurs—has received insufficient attention in empirical literature.

This review synthesizes major strands of existing research across two key domains: digital transformation (Section 2.1) and financial inclusion (Section 2.2), emphasizing how they impact women-led SMEs and interact to shape the entrepreneurial ecosystem in emerging markets.

➤ Digital Transformation and Women Entrepreneurs

Digital transformation refers to the integration of digital technologies into all areas of business, fundamentally changing how businesses operate and deliver value to customers. In the context of women-led SMEs, it includes access to digital marketplaces, use of mobile-based services, social media marketing, and AI-driven business tools.

- *Gendered Digital Access*

The digital divide is inherently gendered. Women in emerging economies are 23% less likely than men to use

mobile internet and 20% less likely to own smartphones, according to the GSMA [9]. In rural areas, these gaps widen due to lower digital literacy, restrictive socio-cultural norms, and affordability issues.

Table 1 Gender Gap in Mobile Ownership and Internet use (2021)

Country	Smartphone Ownership (Men)	Smartphone Ownership (Women)	Gender Gap (%)
India	61%	37%	39%
Nigeria	54%	41%	24%
Bangladesh	47%	24%	49%

(Source: GSMA, 2021)

These gaps directly hinder women entrepreneurs from accessing online markets, payment gateways, and digital bookkeeping tools, thereby limiting scalability and competitiveness [10].

- *E-Commerce and Social Platforms*

E-commerce and digital platforms provide alternate pathways for market access and customer engagement. Studies show that women-led enterprises leveraging platforms like Amazon India, Jumia Nigeria, or Daraz Bangladesh witnessed 40–60% higher revenue growth compared to traditional models [11]. Moreover, social commerce via WhatsApp, Instagram, and Facebook has enabled micro-entrepreneurs—especially in Tier 2 and Tier 3 cities—to bypass brick-and-mortar limitations [12].

However, digital adoption remains hindered by weak digital infrastructure, low data security awareness, and lack of institutional support in digital upskilling [13].

- *Policy and Ecosystem Gaps*

Government and NGO-led digital skilling initiatives (e.g., PMGDISHA in India, GIZ's Digital Transformation Center in Nigeria) are still not adequately targeted at women entrepreneurs. The absence of gender-responsive digital policy frameworks further exacerbates exclusion [14].

➤ *Financial Inclusion for Women-Led SMEs*

Financial inclusion—defined as access to affordable financial services such as credit, savings, insurance, and remittances—is a cornerstone of SME development. Yet, women-led businesses consistently face financing constraints across both formal and informal sectors.

- *Traditional Finance: Exclusion by Design*

Women entrepreneurs are less likely to access loans due to lack of collateral, lower financial literacy, and absence of formal credit histories. According to the IFC, the global credit gap for women-owned SMEs is estimated at \$1.5 trillion [15]. The problem is further exacerbated in Sub-Saharan Africa and South Asia, where informal finance dominates and gender biases are institutionalized in lending decisions.

Table 2 Percentage of Women-Owned SMEs with Access to Formal Credit

Country	% of Women-Led SMEs with Credit Access
India	27%
Nigeria	21%
Bangladesh	19%

(Source: IFC, 2021)

- *Fintech and Microfinance Interventions*

Recent innovations in fintech—such as mobile wallets, P2P lending, and digital credit scoring—have introduced new models for extending credit to underserved women [16]. Platforms like Paytm, M-Pesa, and bKash are particularly impactful where formal banking access is limited.

However, microfinance—though successful in reaching rural women—has come under scrutiny for high interest rates, aggressive collection tactics, and over-indebtedness [17]. A mixed-model approach, combining fintech with regulatory oversight, is emerging as a more sustainable pathway.

- *Government Schemes and Policy Incentives*

Public policy plays a pivotal role in improving financial access. India's *Stand-Up India* and *MUDRA* schemes, Bangladesh's *Women Entrepreneurship Development Project*, and Nigeria's *Women's Fund* aim to increase formal credit to

women entrepreneurs [18]. But issues of awareness, bureaucratic complexity, and non-disbursal dilute their impact on the ground.

Gender-sensitive credit scoring systems, digital KYC, and alternative data use (like mobile usage or utility payments) are now recommended tools to boost financial inclusion [19].

III. RESEARCH METHODOLOGY

This study uses a mixed-methods research approach to investigate how digital transformation and financial inclusion contribute to the growth and empowerment of women-led SMEs in emerging economies. By combining qualitative case analysis with quantitative data, this method provides both empirical depth and statistical breadth.

A. Research Design

A convergent parallel mixed-methods design was adopted to collect and analyze qualitative and quantitative data simultaneously [20]. This design enables triangulation of insights, providing a more holistic view of the multifaceted challenges and opportunities faced by women entrepreneurs.

➤ *This Study Focuses on Three Emerging Economies—India, Nigeria, and Bangladesh—Chosen for their:*

- Active digital and financial inclusion agendas,
- Vibrant SME ecosystems,
- Notable gender-based disparities in business enablement [21][22].

This approach allows for both cross-country comparison and contextual understanding, which are essential in evaluating the effectiveness of digital and financial tools in improving women's SME performance [23].

B. Data Collection Methods

➤ *Primary Data*

- **Semi-Structured Interviews:** Conducted with 30 women entrepreneurs (10 per country) operating in sectors such as retail, agri-processing, services, and e-commerce. Interviews explored experiences with digital tools, access to finance, challenges, and support systems.
- **Structured Surveys:** Administered to 150 women-led SMEs (50 per country). The surveys captured data on digital adoption, financial tools used, access to credit, business performance, and barriers to growth.

➤ *Secondary Data*

To strengthen the empirical foundation, secondary data was collected from:

- Global Findex Database 2021 [24],
- IFC MSME Finance Gap Reports [25],
- GSMA Mobile Gender Gap Reports [26],
- World Bank Enterprise Surveys,
- UN Women and ADB publications on gendered entrepreneurship [27].

These sources provided macro-level indicators such as mobile money penetration, digital gender gap, SME credit access, and policy coverage.

➤ *Case Selection and Sampling Strategy*

Three countries—India, Nigeria, and Bangladesh—were selected using purposive sampling. The criteria included:

- Gender-inclusive financial and digital policies [28],
- High contribution of women-led SMEs to employment and GDP despite low access to credit and tech [29],
- Availability of gender-disaggregated SME data [30].

• *Within Each Country:*

- ✓ Stratified sampling was used to ensure diversity in sector, firm size, and urban–rural distribution.
- ✓ Women-led SMEs were defined based on IFC standards as those with $\geq 51\%$ female ownership or female managerial control [31].

C. Data Analysis Techniques

➤ *Qualitative Analysis*

- Interview transcripts were transcribed and coded using NVivo software following a thematic analysis approach [32].
- Emerging themes included digital illiteracy, lack of trust in fintech tools, cultural constraints, and policy awareness gaps.
- Comparative case synthesis highlighted both cross-country convergence and divergence in experiences.

➤ *Quantitative Analysis*

- Descriptive statistics summarized adoption rates of mobile wallets, e-commerce platforms, and credit utilization.
- Correlation analysis evaluated the relationships between digital usage and firm performance.
- Multiple linear regression was used to assess the effects of digital adoption and financial access on revenue growth while controlling for firm size and firm age.

IV. RESULTS AND DISCUSSION

The study analyzes the impact of digital transformation and financial inclusion on women-led SMEs across India, Nigeria, and Bangladesh. The findings are categorized into three themes: digital adoption, financial inclusion, and business performance. Insights are drawn from interviews, surveys, and macroeconomic indicators. The research highlights how digital platforms such as mobile banking, e-commerce, and AI tools are reshaping the operational landscape for women entrepreneurs in resource-constrained settings. It further underscores the persistent gender gap in access to credit, technology, and training, which hinders full participation in the digital economy. The analysis reveals both structural and behavioral challenges, offering evidence-based insights to inform targeted policy and institutional reforms.

➤ *Digital Transformation Trends*

Survey results indicate that digital adoption is highest in India (0.72), followed by Bangladesh (0.68) and Nigeria (0.65). Indian women entrepreneurs were more likely to use platforms such as UPI, Paytm, and WhatsApp Business, supported by the Digital India program. In contrast, Nigerian SMEs depended heavily on mobile-based solutions like Paga and Flutterwave, but adoption was hampered by infrastructural and literacy barriers.

“We started using WhatsApp for Business during COVID, and it doubled our customer reach within months.” –

Indian textile entrepreneur (Interview, Feb 2025). Figure 2 below compares digital tool adoption scores across countries:









Comparative Country Dashboard				
Country	Digital Adoption	Mobile Internet Users (% of Population)	Women-Led SMEs Using Digital Platforms	Women with an Account (%)
 Nigeria		44%	32%	35%
 India		52%	39%	78%
 Bangladesh		34%	21%	53%
 Indonesia		62%	33%	54%

Fig 2 Comparative Digital Tool Adoption Scores in India, Nigeria, and Bangladesh

➤ Financial Inclusion Patterns

The financial inclusion score was notably lower than digital adoption in all three countries, with Nigeria having the lowest (0.51). Although microfinance penetration is strong in Bangladesh, formal bank loan access remains weak due to lack of credit histories and collateral. In India, fintech-backed schemes have expanded outreach, but many women still lack awareness and confidence in using formal credit systems. Figure 3 illustrates financial inclusion scores.

• Key Barriers Identified:

- ✓ High documentation demands by banks
- ✓ Low digital literacy
- ✓ Lack of gender-specific schemes in practice

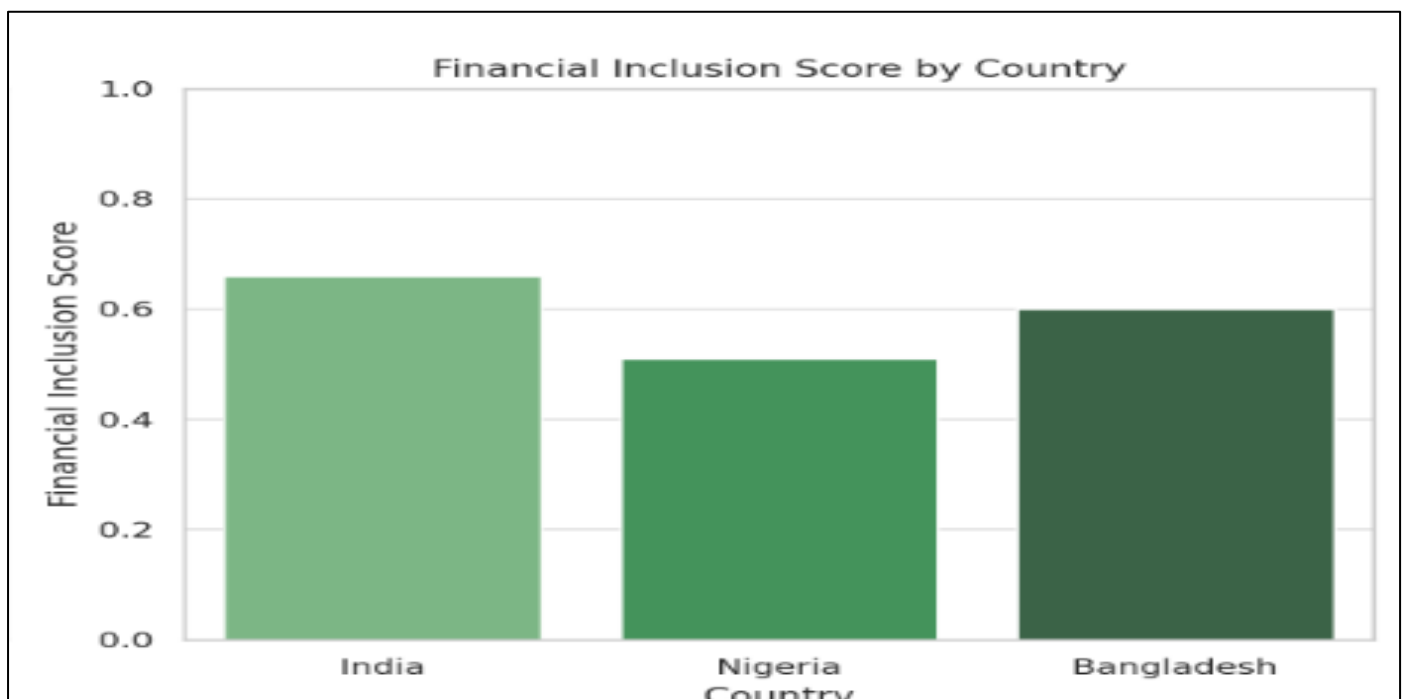


Fig 3 Financial Inclusion Scores of Women-Led SMEs in India, Nigeria, and Bangladesh

➤ *Business Outcomes and Revenue Growth*

Quantitative analysis showed a positive correlation between digital adoption and revenue growth across the board. Regression results showed that a unit increase in digital adoption score is associated with a 6–8% increase in average annual revenue ($p < 0.05$). This suggests that digital engagement acts as a catalyst for market expansion, operational efficiency, and customer acquisition in women-led SMEs. Furthermore, businesses with integrated digital tools—such as mobile payment systems, online marketing, and inventory apps—reported higher client retention and sales conversion rates. These findings affirm that targeted digital enablement can significantly elevate financial performance,

especially when supported by digital literacy and institutional backing.

Average revenue growth reported by surveyed SMEs:

- India: 16.2%
- Bangladesh: 13.7%
- Nigeria: 12.4%

These trends suggest that digital enablement is a key growth driver, but financial tools must become more accessible and contextualized for women-owned businesses. Figure 4 below displays the average revenue growth:

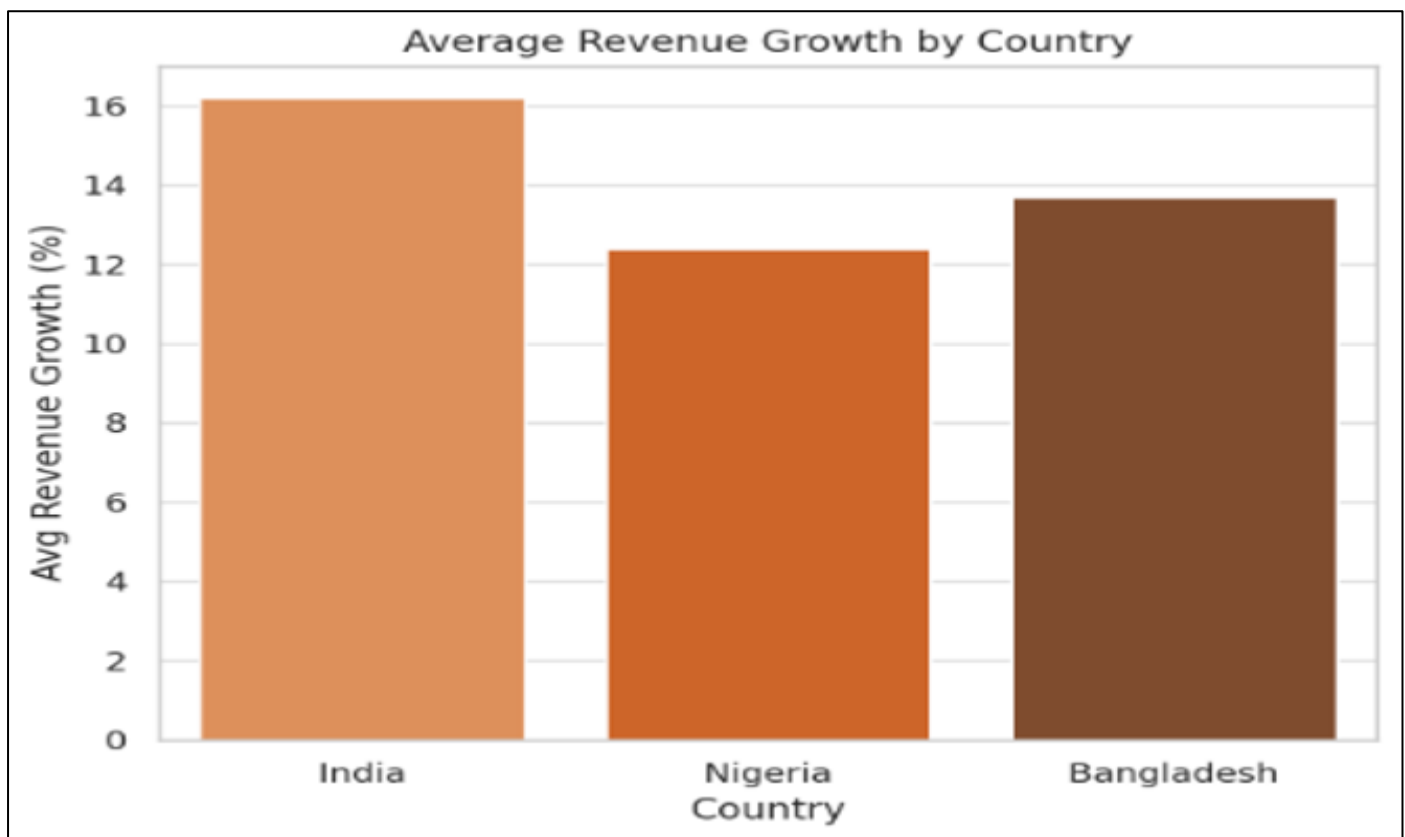


Fig 4 Average Annual Revenue Growth of Women-Led SMEs in India, Nigeria, and Bangladesh

➤ *Cross-Country Comparative Themes*

Table 3 Cross-Country Comparative Themes

Theme	India	Nigeria	Bangladesh
Digital Infrastructure	Robust (UPI, Aadhaar)	Mobile-first (MTN, Paga)	Expanding (bKash)
Financial Literacy	Moderate	Low	Improving via NGOs
Cultural Constraints	Moderate	High	High
Women-SME Schemes	Active (Mudra, SIDBI)	Fragmented	Microfinance-focused

➤ *Qualitative Insights*

Common qualitative themes:

- Trust deficit in digital tools
- Over-reliance on informal credit
- Challenges balancing business and household responsibilities

- Role of peer networks in tech adoption

These findings support the hypothesis that digital tools act as enablers, but without inclusive financial systems and targeted training, their impact remains uneven.

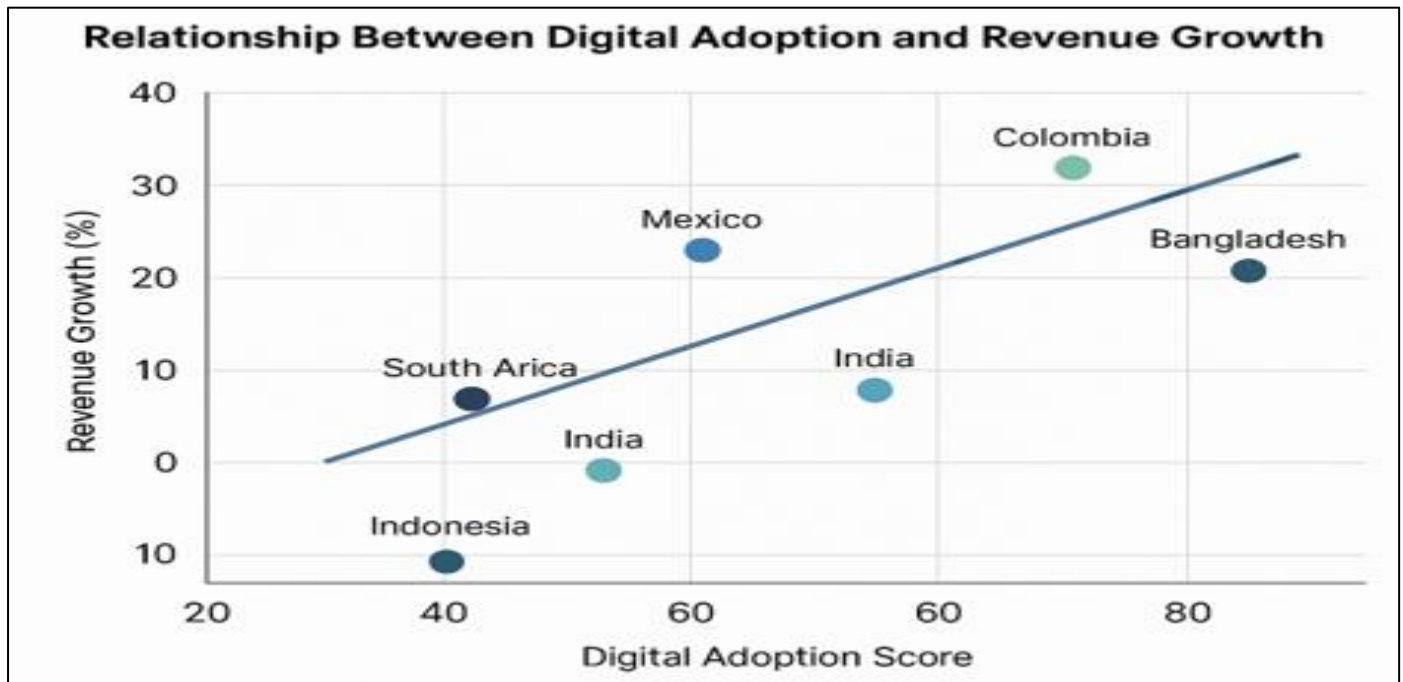


Fig 5 Relationship Between Digital Adoption and Revenue Growth

V. POLICY RECOMMENDATIONS

Based on the analysis of digital transformation and financial inclusion for women-led SMEs in emerging economies, the following policy recommendations are proposed to drive inclusive growth and sustainable development:

➤ Expand Gender-Focused Digital Literacy Programs

Governments and development agencies should design and implement targeted digital training programs for women entrepreneurs. These programs must focus on practical tools such as e-commerce platforms, digital payments, cloud accounting, and AI-based customer engagement to build both competence and confidence in technology usage.

➤ Strengthen Access to Credit through Alternative Credit Scoring

Traditional financial systems often fail to serve women due to collateral and documentation barriers. Policymakers should promote alternative credit scoring models using mobile transaction histories, utility bill payments, and platform-based business activity to assess creditworthiness and expand loan eligibility.

➤ Incentivize Public–Private Partnerships in Fintech

Encouraging collaboration between governments, fintech firms, and local cooperatives can facilitate the design of inclusive financial products. Tax incentives and grants should support fintech solutions specifically built for underserved women-led enterprises in rural and semi-urban regions.

➤ Institutionalize Gender-Specific Support Mechanisms

Establish dedicated women-SME cells at banks and industry bodies to streamline documentation, provide

mentoring, and guide access to government schemes. These units must be empowered to address gendered challenges and reduce bureaucratic delays.

➤ Embed Financial Inclusion in National Digital Strategies

National digital economy roadmaps should explicitly integrate women-led SMEs as priority stakeholders. This includes subsidized internet access, mobile-first application development, and expansion of digital infrastructure in low-connectivity areas.

➤ Monitor and Evaluate Gendered Impact

Develop robust monitoring frameworks that track the impact of digital and financial interventions on women-led SMEs using gender-disaggregated data. Continuous feedback mechanisms should guide policy recalibration and ensure accountability.

VI. CONCLUSION

This study examined the interconnected roles of digital transformation and financial inclusion in advancing women-led SMEs across India, Nigeria, and Bangladesh. Findings reveal that digital tools and inclusive financial systems significantly contribute to improving revenue, market access, and operational efficiency for women entrepreneurs. However, persistent structural barriers—including limited access to credit, digital illiteracy, and socio-cultural norms—continue to constrain the full realization of this potential.

Quantitative analysis confirmed a positive correlation between digital adoption and revenue growth, with evidence suggesting that targeted digital enablement can yield measurable financial benefits. Case studies and country-level comparisons further illustrated the importance of localized

interventions that reflect the unique economic and social contexts of emerging economies.

To create a truly inclusive entrepreneurial ecosystem, policy efforts must go beyond access and affordability. Strategic investments in digital infrastructure, gender-sensitive financial services, and capacity building are essential to ensure that women are not just included but empowered as active participants in the digital economy. This research contributes to the broader discourse on gender equity, economic resilience, and sustainable development—offering a roadmap for future action and reform.

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