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Scientific Trend Cartography of Digital Microfinance Research: Mapping Knowledge Evolution and Research Frontiers (2010–2025)

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ABSTRACT

This study presents a scientific trend cartography of digital microfinance research published between 2010 and 2025, aiming to map the field's intellectual structure, thematic evolution, and emerging research frontiers. Using a bibliometric research design and data retrieved from the Scopus database, the study applies co-authorship, co-citation, keyword co-occurrence, overlay, and density analyses implemented through VOSviewer. The results reveal that microfinance and financial inclusion form the core knowledge base of the field, while closely interconnected themes such as fintech, digital finance, and digital transformation illustrate the progressive integration of technology into inclusive financial systems. Temporal analysis indicates a clear evolution from early concerns with ICT adoption, literacy, and institutional capacity toward more recent emphases on sustainability, risk assessment, digital platforms, women empowerment, and alignment with the Sustainable Development Goals (SDGs). The findings demonstrate that digital microfinance has matured into a multidisciplinary socio-technical domain embedded within broader development and governance discourses. By visualizing knowledge clusters and research trajectories, this study provides a comprehensive overview of the field's evolution and offers a forward-looking research agenda to support future theoretical development, policy design, and practice in inclusive digital finance.

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1. INTRODUCTION

Over the past decade and a half, the rapid diffusion of digital technologies has transformed the financial services landscape, particularly in developing economies where traditional banking infrastructures remain limited. Digital microfinance has emerged as a key instrument for fostering financial inclusion, reducing poverty, and enabling small enterprises to access essential capital [1], [2]. Unlike conventional microfinance, which often relies on labor-intensive processes and face-to-face interactions, digital microfinance leverages mobile platforms, algorithmic decision-support systems, and data-driven credit evaluation tools to expand outreach more efficiently [3]. As a result, digital microfinance has become intertwined with broader national financial inclusion strategies and global development agendas emphasizing inclusive growth and equitable digital transformation [4], [5].

The evolution of digital microfinance research reflects the broader trajectories of financial technology (FinTech), big data analytics, and mobile money ecosystems. In its early stages (2010–2014), scholarly attention primarily focused on understanding how mobile banking infrastructures could support microfinance institutions and reduce operational costs [6]. Subsequently, between 2015 and 2019, research interests shifted toward digital credit scoring, platform governance, user experience, and risk management frameworks informed by data analytics and behavioral insights [7]. More recently, from 2020 onward, the field has expanded into emerging domains such as AI-driven credit assessment, blockchain-enabled microfinance, digital identity verification, and regulatory sandboxes for low-income markets [8]. This dynamic expansion illustrates the deepening complexity and multidisciplinary nature of digital microfinance research.

Given this rapid intellectual growth, understanding the structural evolution of digital microfinance knowledge has become increasingly important. Scholars and policymakers alike need systematic tools to trace how research themes emerge, evolve, and intersect within the broader FinTech ecosystem. Scientific trend cartography offers a powerful method for identifying foundational works, knowledge clusters, and shifting research frontiers [9]. Through co-citation, co-authorship, and keyword co-occurrence analyses, scientific cartography provides a structured representation of the field's intellectual architecture. This helps illuminate how academic discourse progresses and where future research opportunities may lie.

The period from 2010 to 2025 represents a critical window for examining the knowledge evolution of digital microfinance. These years encompass the rise of mobile money in Sub-Saharan Africa, the global expansion of platform-based microcredit, the proliferation of AI-enabled scoring models, and major disruptions triggered by the COVID-19 pandemic, which accelerated the adoption of digital financial services in underserved communities [10]. Moreover, regulatory shifts during this period—including data privacy laws, digital banking frameworks, and consumer protection policies—significantly shaped both practice and scholarly inquiry. Capturing these transformations through scientific trend cartography will allow researchers to understand not only what has been studied, but also how interdisciplinary forces have influenced the field's development.

A comprehensive mapping of digital microfinance research is also essential for bridging gaps between academic knowledge and industry innovation. FinTech startups, microfinance institutions, and development agencies are actively experimenting with new digital models, yet academic research may not always keep pace with innovation cycles [11], [12]. By visualizing research trajectories and identifying areas of fragmentation or under exploration, scientific trend mapping can help align scholarly insight with real-world challenges such as digital exclusion, cybersecurity risks, algorithmic bias, and platform sustainability. In addition, identifying emerging clusters enables stakeholders to prioritize research investments and collaborative opportunities that can improve digital microfinance outcomes for vulnerable populations.

Despite the rapid expansion of digital microfinance research, the field lacks a systematic, longitudinal, and visualized mapping of its knowledge evolution. Existing reviews are often thematic or narrative in nature, offering partial perspectives that do not fully capture the structural relationships among concepts, authors, and research domains over time (Jafari & Ahmed, 2021). Consequently, there remains limited understanding of how the field's intellectual foundations have shifted, which topics have gained or lost prominence, how global events have influenced scholarly attention, and where emerging research frontiers are forming. This gap restricts the ability of researchers, practitioners, and policymakers to make informed decisions based on a comprehensive view of the research landscape. This study aims to construct a

scientific trend cartography of digital microfinance research from 2010 to 2025.

2. METHOD

This study employed a bibliometric research design to systematically analyze and visualize the knowledge evolution of digital microfinance literature published between 2010 and 2025. Bibliometric analysis was chosen because it enables the quantitative examination of large bodies of scholarly works, revealing structural relationships, thematic clusters, and intellectual trends within a research field. The dataset was retrieved from Scopus Database. To ensure relevance, search strings were constructed using combinations of keywords such as "digital microfinance," "digital lending," "FinTech microcredit," "mobile microfinance," "digital financial inclusion," and related terms. Publications were filtered by year, document type, and subject area, and duplicate records were removed prior to analysis.

After data collection, a series of bibliometric techniques were applied to examine the intellectual structure and thematic patterns of digital microfinance research. Co-authorship analysis was used to map collaborative networks among researchers and institutions, while co-citation analysis identified influential authors, seminal publications, and the underlying intellectual foundations of the field. To uncover thematic evolution, keyword co-occurrence analysis was conducted to detect recurring conceptual linkages and emerging research hotspots. These analytical methods were implemented using VOSviewer software, each offering distinct functions for network construction, cluster detection, and temporal mapping. The combination of these tools allowed for multilayered visualization of the field's development over the 15-year study period.

3. RESULT AND DISCUSSIONS

3.1 Network Visualization

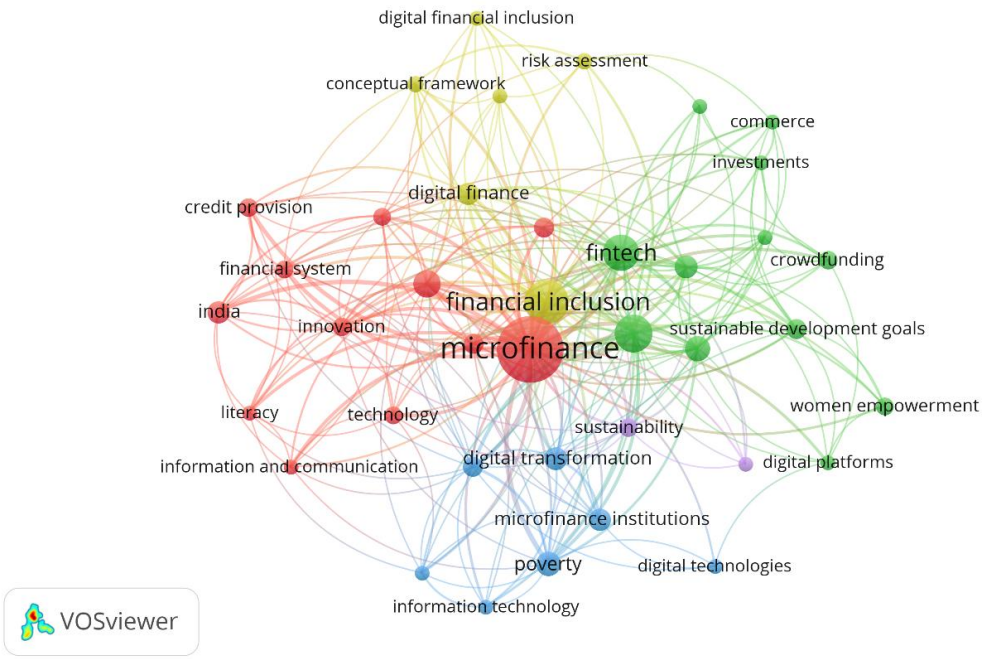

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

Figure 1 positions microfinance as the central and most dominant node, indicating its role as the core knowledge anchor in digital microfinance research between 2010–2025. The dense interconnections between microfinance, financial inclusion, fintech, and digital finance suggest that the literature has

gradually shifted from traditional microcredit mechanisms toward digitally enabled financial inclusion frameworks. This centrality reflects a consolidation phase where microfinance is no longer studied in isolation, but increasingly embedded within broader digital financial ecosystems, linking technology adoption, institutional transformation, and inclusion-oriented development goals. From a structural perspective, the visualization reveals four major thematic clusters, differentiated by color and proximity, each representing a coherent stream of research. The red cluster emphasizes system-level and capability issues such as credit provision, financial systems, innovation, technology, literacy, and country-specific contexts (e.g., India), highlighting early-stage concerns about access, infrastructure, and readiness. The green cluster is strongly aligned with fintech, crowdfunding, investments, commerce, women empowerment, and the Sustainable Development Goals (SDGs), signaling a normative and impact-oriented research stream that links digital microfinance to inclusive and sustainable development outcomes.

Table 1. Main Knowledge Clusters in Digital Microfinance Research (2010–2025)

Cluster Color	Core Keywords	Thematic Focus	Research Orientation
Red	Microfinance, credit provision, financial system, literacy, innovation, technology, India	Institutional foundations and access mechanisms	System development & financial inclusion basics
Green	Fintech, crowdfunding, investments, commerce, SDGs, women empowerment	Digital finance as a driver of sustainable development	Impact-oriented & policy-relevant
Blue	Digital transformation, microfinance institutions, poverty, information technology	Organizational and operational digitalization	Institutional adaptation & efficiency
Yellow	Digital financial inclusion, risk assessment, conceptual framework, digital finance	Analytical models and risk governance	Conceptual & methodological advancement

Source: Data Analysis, 2025

The blue cluster highlights the operational transformation of microfinance institutions, connecting digital transformation, information technology, poverty, and microfinance institutions. This cluster reflects a meso-level research focus on how MFIs adapt digitally to improve efficiency, outreach, and poverty-targeting effectiveness. The presence of poverty-related keywords indicates that digital transformation is not treated merely as a technological upgrade, but as a mechanism to enhance social impact. Meanwhile, the yellow cluster containing digital financial inclusion, risk assessment, and conceptual framework signals a more analytical and theory-building strand of research, concerned with risk modeling, governance, and the formalization of digital microfinance concepts.

The map illustrates an evolutionary trajectory of the field: from foundational access and literacy issues (red), toward institutional digitalization (blue), and onward to fintech-enabled sustainability and empowerment narratives (green), with conceptual consolidation and risk governance emerging as cross-cutting themes (yellow). This configuration suggests that current research frontiers lie at the intersection of fintech innovation, inclusion outcomes, and risk

management particularly in areas such as algorithmic credit scoring, platform-based microfinance, and alignment with SDGs. As such, the cartography not only captures the intellectual structure of the field but also reveals how digital microfinance research is increasingly positioned as a strategic tool for inclusive and sustainable development rather than merely a financial service innovation.

3.2 *Overlay Visualization*

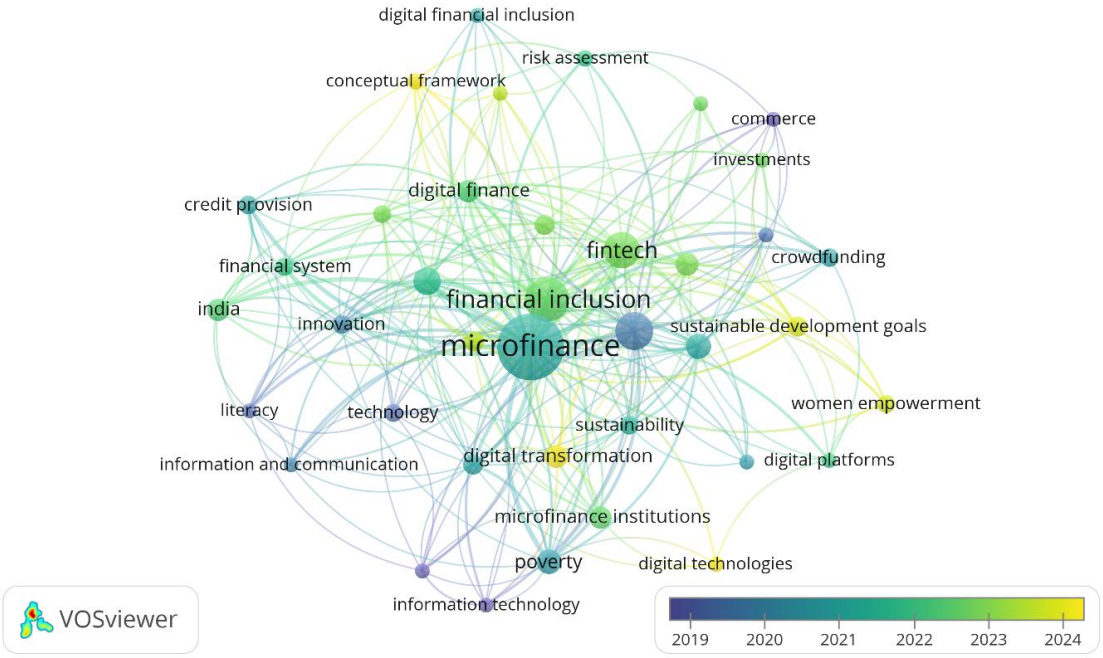

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

Figure 2 reveals the temporal evolution of digital microfinance research by coloring keywords according to their average publication year. Microfinance remains the intellectual anchor of the field across the entire period, but its surrounding themes show a clear shift over time. Earlier research (darker blue tones, around 2019–2020) concentrates on foundational issues such as information technology, literacy, poverty, information and communication, and microfinance institutions. This phase reflects a concern with technological readiness, basic ICT adoption, and the role of MFIs in addressing poverty through digitized (but still institution-centric) approaches.

Moving into the mid-period (greenish tones, around 2021–2022), the literature increasingly converges around financial inclusion, fintech, digital finance, innovation, and financial systems. This indicates a conceptual transition from technology as a support tool toward fintech-driven inclusion frameworks, where digital microfinance is embedded within broader financial ecosystems. During this stage, research begins to emphasize system integration, scalability, and the interaction between microfinance, fintech platforms, and national financial infrastructures, particularly in emerging economies such as India. The most recent research frontiers (yellow tones, 2023–2024) are strongly associated with sustainable development goals, women empowerment, digital platforms, digital technologies, risk assessment, and conceptual frameworks. This pattern signals a maturation of the field, where attention shifts toward impact, governance, and sustainability rather

than access alone. Digital microfinance is increasingly examined as a strategic instrument for achieving SDGs, managing digital credit risk, and empowering marginalized groups through platform-based models.

3.3 *Citation Analysis*

Table 2. Most Cited Article

Citations	Author and Year	Title
287	[13]	Microfinance, financial inclusion and ICT: Implications for poverty and inequality
180	[14]	From the wisdom of crowds to my own judgment in microfinance through online peer-to-peer lending platforms
116	[15]	Sustainability in FinTechs: An explanation through business model scalability and market valuation
99	[16]	Online peer-to-peer lending: A review of the literature
93	[17]	Can digital technologies reshape rural microfinance? Implications for savings, credit, & insurance
80	[18]	Information and communication technology and the sustainability of microfinance
75	[19]	Banking on refugees: Racialized expropriation in the fintech era
72	[20]	Contesting digital finance for the poor
71	[21]	Research advances on financial inclusion: A bibliometric analysis
62	[22]	White paper report of the rad-aid conference on international radiology for developing countries: Identifying challenges, opportunities, and strategies for imaging services in the developing world

Source: Scopus, 2025

3.4 *Density Visualization*

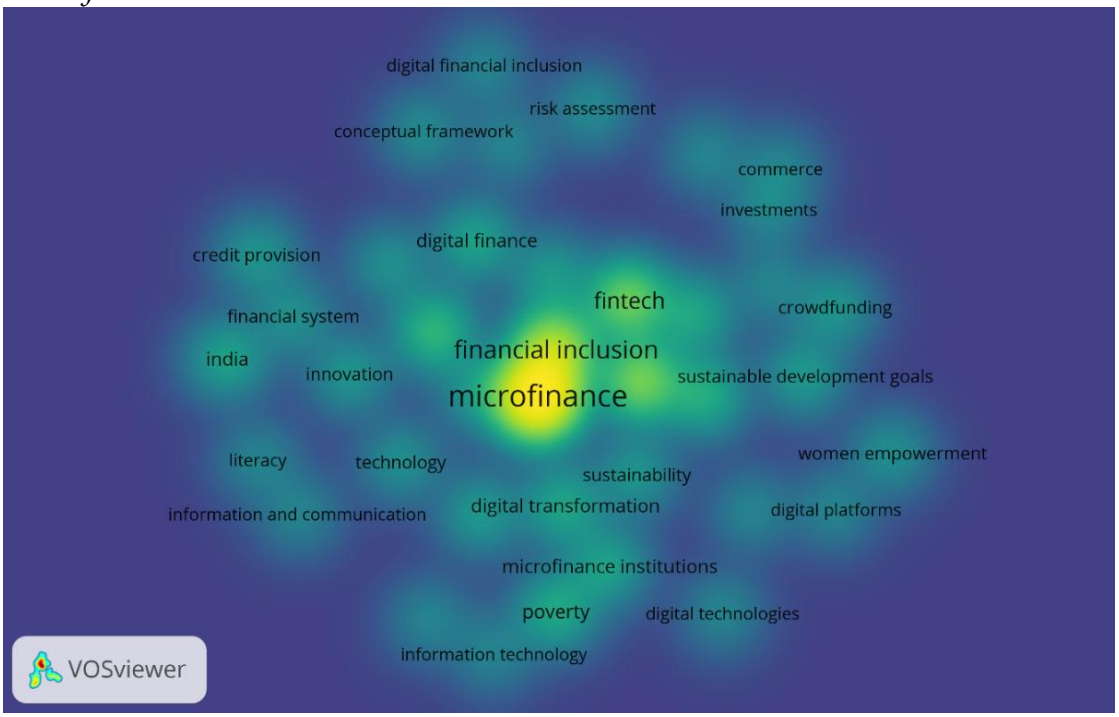

Figure 3. Density Visualization
Source: Data Analysis Result, 2025

Figure 3 highlights the intensity and concentration of research themes within digital microfinance by displaying areas with higher keyword

frequency in brighter colors. The brightest and most central zone is formed by microfinance and financial inclusion, confirming that these concepts constitute the core knowledge base of the field. Closely surrounding this nucleus are fintech, digital finance, and sustainability, indicating that digital microfinance research is strongly anchored in the integration of technological innovation with inclusion-oriented financial objectives. This dense central clustering suggests that most studies frame digital tools primarily as mechanisms to expand access to financial services rather than as standalone technological phenomena. Beyond the core, moderately dense regions reveal complementary but less dominant themes such as digital transformation, microfinance institutions, poverty, information technology, and literacy, reflecting sustained attention to institutional capacity, socio-economic outcomes, and technological readiness. More peripheral and lower-density areas such as crowdfunding, digital platforms, women empowerment, risk assessment, and sustainable development goals, indicate emerging or specialized research directions that, while growing, have not yet reached the same level of consolidation.

3.5 Co-Authorship Network

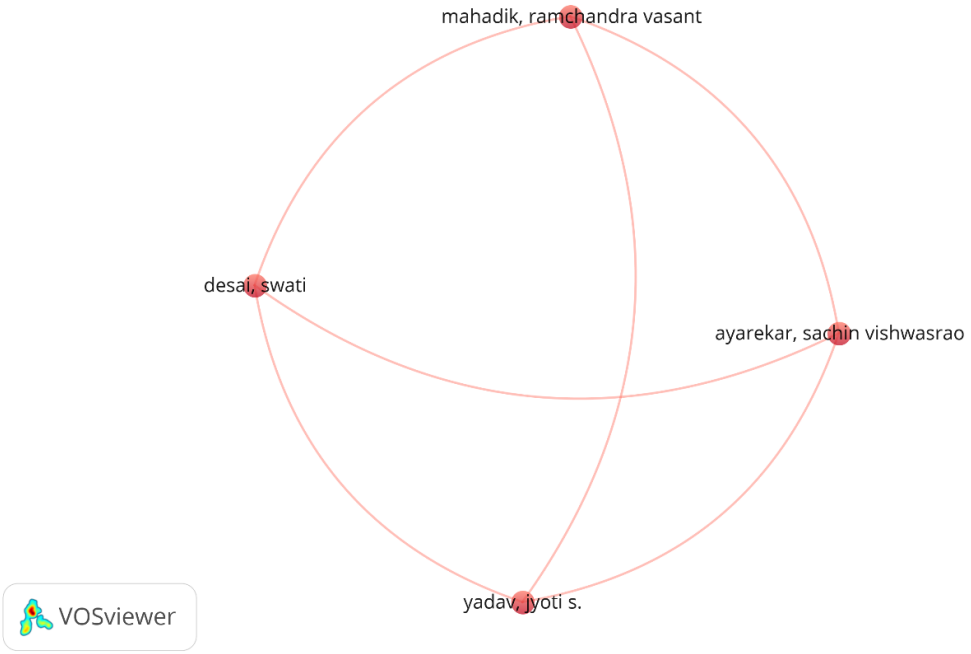

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

Figure 4 shows a small but tightly connected cluster of authors, indicating a focused and collaborative research niche within the digital microfinance literature. The strong links among Mahadik, Ramchandra Vasant, Ayarekar, Sachin Vishwasrao, Yadav, Jyoti S., and Desai, Swati suggest repeated co-authorship and a stable collaboration pattern, likely centered on shared research themes or institutional affiliations. The limited size of the network and absence of multiple clusters imply that influential contributions in this substream are concentrated among a few closely collaborating scholars, reflecting a specialized authorship structure rather than a broadly dispersed global collaboration network.

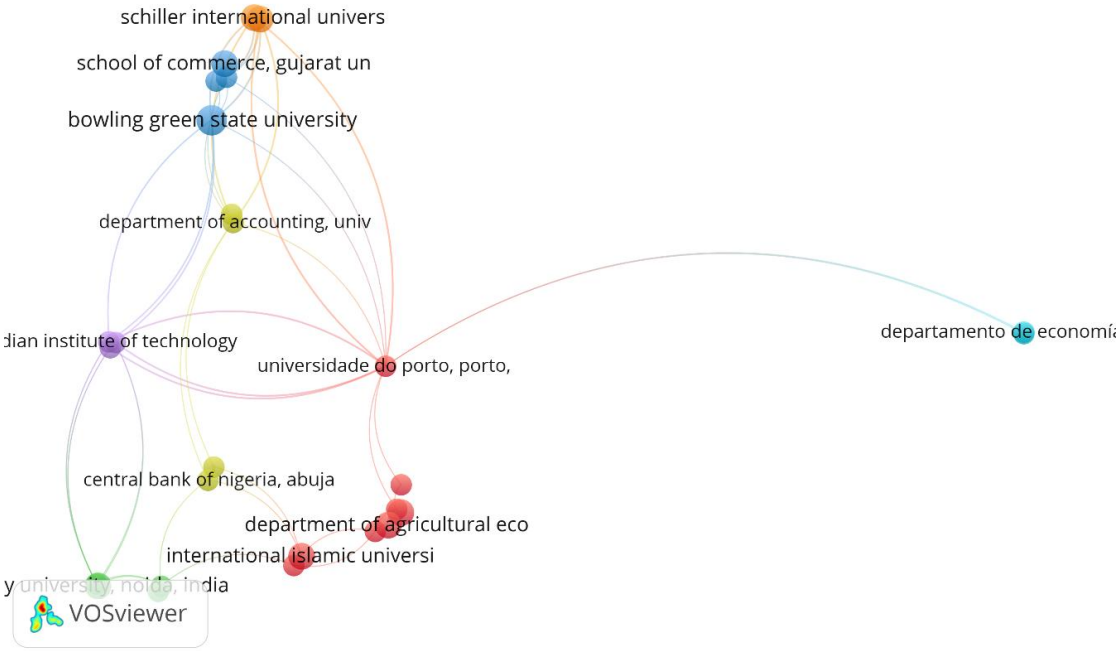

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2025

Figure 5 illustrates a fragmented but interconnected landscape of organizations contributing to digital microfinance research. A central bridging role is played by the Universidade do Porto (Portugal), which connects multiple academic and applied institutions, indicating its function as a key international collaboration hub. Surrounding this node are universities and research units from diverse regions such as Bowling Green State University and Schiller International University (United States), School of Commerce, Gujarat University and other Indian institutions, as well as policy-oriented bodies like the Central Bank of Nigeria, Abuja highlighting the interdisciplinary and cross-sectoral nature of the field. The presence of specialized units (e.g., departments of accounting, agricultural economics, and economics) suggests that digital microfinance research draws on varied disciplinary perspectives, while the relatively sparse network structure implies that institutional collaboration remains selective and regionally clustered rather than globally dense.

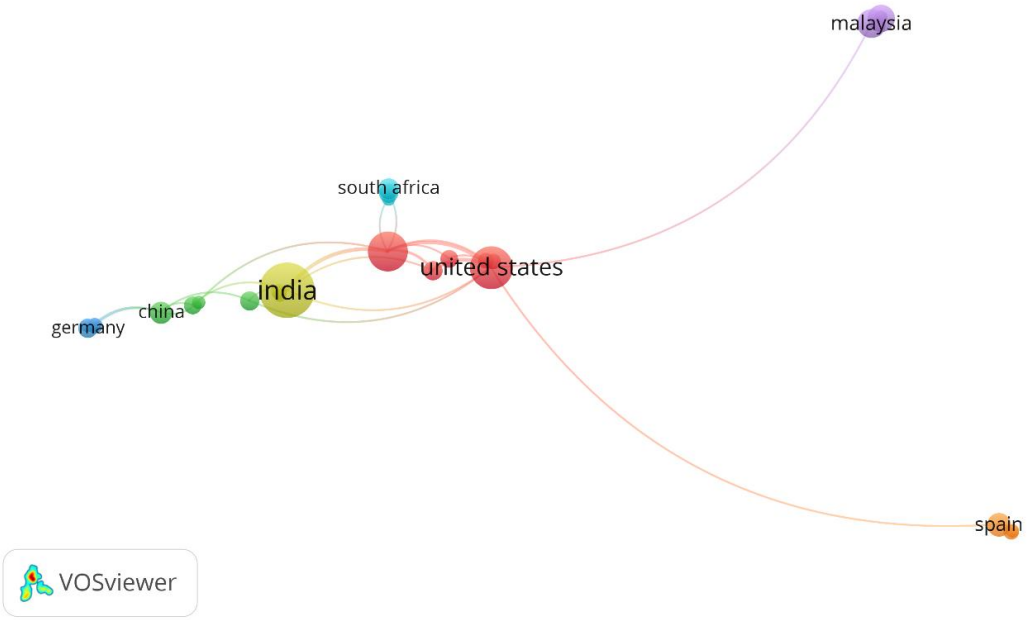

Figure 6. Country Visualization
Source: Data Analysis Result, 2025

Figure 6 reveals that digital microfinance research is anchored by a small number of highly influential countries, with India and the United States emerging as the most prominent hubs. India's large node size reflects its strong research output and substantive engagement with microfinance as a development tool, while the United States functions as a key international connector, linking collaborations with countries such as Spain and Malaysia. The proximity and linkage between India, China, and Germany indicate regionally clustered collaborations, particularly within emerging and advanced economies interested in fintech-enabled inclusion. Meanwhile, the presence of South Africa as an intermediary node highlights growing participation from the Global South.

3.6 Discussion

a. Practical Implication

The findings of this study offer several practical implications for policymakers, microfinance institutions (MFIs), fintech firms, and development agencies. First, the strong centrality of microfinance and financial inclusion indicates that digital technologies should be treated as enablers of inclusive finance, not merely as operational tools. Policymakers can leverage this insight to design regulatory frameworks that support fintech–MFI collaboration while safeguarding consumer protection, particularly in areas such as digital credit, risk assessment, and data privacy. Second, the growing prominence of themes related to sustainability, SDGs, and women empowerment suggests that digital microfinance initiatives should be explicitly aligned with measurable social and development outcomes. Practitioners can use these insights to integrate impact metrics—such as poverty reduction, gender inclusion, and MSME resilience—into digital financial products and platforms. Finally, the emergence of platform-based models (e.g., crowdfunding and digital platforms) highlights opportunities for MFIs and fintech

providers to scale outreach through ecosystem partnerships rather than standalone institutional expansion.

b. Theoretical Contribution

This study contributes theoretically by providing a systematic cartography of the intellectual structure and evolution of digital microfinance research from 2010 to 2025. Unlike prior reviews that focus on specific dimensions (e.g., fintech adoption or microfinance impact), this research integrates co-occurrence, overlay, and density analyses to reveal how the field has evolved from foundational ICT and literacy concerns toward fintech-enabled inclusion and, more recently, sustainability- and governance-oriented themes. The identification of distinct yet interconnected knowledge clusters enriches the theoretical understanding of digital microfinance as a multidisciplinary domain situated at the intersection of financial inclusion theory, digital transformation, and sustainable development. Moreover, by highlighting emerging frontiers such as risk assessment, digital platforms, and SDG alignment this study advances theory by framing digital microfinance not only as a financial innovation, but as a socio-technical system embedded within broader development and institutional contexts.

c. Limitations and Future Research Directions

Despite its contributions, this study has several limitations that should be acknowledged. First, the analysis relies on a single bibliographic database, which may exclude relevant studies published in non-indexed journals or regional outlets, particularly from developing countries where microfinance practice is most prevalent. Second, bibliometric methods emphasize structural and relational patterns but do not capture the substantive quality or causal mechanisms discussed within individual studies. As a result, nuanced contextual insights such as regulatory differences or cultural factors may be underrepresented. Third, keyword-based mapping is sensitive to authors' terminology choices, which may lead to conceptual overlap or fragmentation across clusters. Future research could address these limitations by combining bibliometric cartography with systematic literature reviews or qualitative meta-synthesis, expanding database coverage, and conducting comparative regional analyses to deepen understanding of how digital microfinance models perform across diverse institutional and socio-economic settings.

4. CONCLUSION

This study provides a comprehensive scientific trend cartography of digital microfinance research from 2010 to 2025, revealing how the field has evolved from foundational discussions on ICT adoption and microfinance access toward more complex, fintech-enabled, and sustainability-oriented research agendas. By integrating network, overlay, and density visualizations, the analysis demonstrates that digital microfinance is increasingly conceptualized as a multidimensional socio-technical system that links financial inclusion, institutional transformation, and sustainable development outcomes. The identified knowledge clusters and emerging research frontiers, particularly those related to fintech platforms, risk assessment, and SDG alignment highlight both the consolidation and diversification of the field. The study not only clarifies the intellectual structure and evolution of digital microfinance scholarship but also offers a forward-looking research agenda that can guide future theoretical development, policy

formulation, and practice in inclusive digital finance.

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