Asia Pacific Journal of Management and Education (APJME)
Vol. 9 No. 3, pp.485-509, November, 2026
E-ISSN: 2655-2035 P-ISSN: 2685-8835
https://www.ejournal.aibpm.org/index.php/APJME

Mapping the Digital Financial Inclusion Ecosystem: A Bibliometric and Thematic Evolution Analysis of FinTech-Driven Financial Innovation

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ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Restuningdiah, N., Firmansyah, R., & Irafahmi, D. T. (2026). Mapping the digital financial inclusion ecosystem: A bibliometric and thematic evolution analysis of FinTech-driven financial innovation. *Asia Pacific Journal of Management and Education*, *9*(1), 485-509.

DOI:
https://doi.org/10.32535/apjme.v9i3.5199

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Received: 15 September 2026
Accepted: 18 October 2026
Published: 20 November 2026

ABSTRACT

Digital financial inclusion increasingly links payment access with user capabilities and governance. This study maps the growth, intellectual structure, and thematic evolution of financial technology (FinTech)-driven digital financial inclusion research. A quantitative bibliometric and science-mapping analysis examined 659 Scopus-indexed documents published from 2016 to 2026, exported on September 9, 2026. Publication and citation indicators, harmonized author keywords, VOSviewer co-occurrence and co-citation maps, and document-normalized thematic comparisons were analyzed. Of the 659 documents, 460 (69.8%) appeared during 2024–2026; the corpus accumulated 8,672 citations. Financial inclusion (336 documents), FinTech (243), and mobile money (131) formed the conceptual core. Recent themes included digital payments, digital and financial literacy, artificial intelligence, cybersecurity, and sustainability. Co-citation patterns linked development economics, technology adoption, financial inclusion measurement, and digital-finance governance. The findings indicate a transition from mobile-money access toward an ecosystem perspective. Future research and policy should jointly evaluate affordability, capability, consumer protection, infrastructure, and financial resilience.

Keywords: Digital Financial Inclusion; Digital Payments; Financial Innovation; Financial Technology; Thematic Evolution

JEL Classification: G20; O16; O33; D14

INTRODUCTION

Financial inclusion has traditionally focused on whether individuals and firms can access and use affordable financial services, but digitalization has transformed both the means and the meaning of inclusion. Digital payments, mobile money, digital credit, electronic savings, app-based banking, and platform-mediated financial services now create channels through which excluded or underserved users may participate in formal finance without relying on conventional branches. This shift is highly relevant to development. Evidence synthesized in the Global Findex literature links access to financial services with the capacity to manage shocks, invest in health and education, and conduct payments more efficiently (Demirgüç-Kunt et al., 2020). At the same time, digital financial inclusion is not simply an electronic version of conventional account ownership: it depends on connectivity, devices, digital skills, trust, affordable access, institutional safeguards, and the design of the surrounding financial technology (FinTech) ecosystem.

Mobile money provided an early demonstration of digital technology's potential to expand financial access, especially where conventional bank branches were limited. Recent reviews identify its role in enabling payments and transfers while emphasizing that network access, market structure, agents, institutional safeguards, and consumer trust condition the benefits of adoption (Mothobi & Kebotsamang, 2024; Osabutey & Jackson, 2024; Shaikh et al., 2023). This evidence points to a central distinction: a technically available financial service does not necessarily translate into secure, sustained, and beneficial use.

The FinTech literature has expanded from mobile money to diverse digital-finance services and multisided ecosystems. FinTech innovations can reduce transaction frictions, yet effective participation depends on technological, behavioral, organizational, and policy conditions (Senyo & Osabutey, 2020). Studies of financial inclusion in Southeast Asia and India highlight the potential of digital services alongside new regulatory and distributional risks (Morgan, 2022). Ecosystem research further emphasizes interdependence among users, platform operators, incumbent institutions, agents, and regulators (Senyo et al., 2022). This perspective is increasingly important as payment platforms, data infrastructures, and institutional practices become tightly interconnected.

A further shift concerns adoption quality and user capability. Digital services can be available but remain unused or poorly understood. Research links adoption to perceived usefulness, ease of use, trust, awareness, and privacy or security concerns (Al-Okaily et al., 2023; Kee et al., 2024). A review of mobile FinTech adoption in Sub-Saharan Africa likewise identifies perceived usefulness and ease of use as influential correlates (Hornuf et al., 2025). Digital and financial literacy are complementary resources for informed participation, and evidence from Indonesian consumers links digital payment adoption and financial knowledge with well-being (Muat et al., 2025). This emerging literature increasingly distinguishes access to an account from the capability to use financial services effectively.

A third shift concerns the emergence of more complex technological architectures. Blockchain, cryptocurrencies, central bank digital currencies (CBDCs), artificial intelligence, machine learning, digital identity, and real-time payment rails are increasingly incorporated into discussions of financial inclusion. Reviews of FinTech and financial-service digitalization document a growing convergence among mobile technologies, blockchain, artificial intelligence, and digitally delivered financial services (Bhatt et al., 2022). Research on cryptocurrencies and CBDCs further shows how digital

finance is reshaping payment systems and raising new regulatory questions (Allen et al., 2022). CBDC research identifies financial inclusion and payment efficiency as the most frequently discussed motivations for issuance, while also warning that design and implementation choices may create new risks (Ozili, 2023). The resulting research field therefore combines development finance, information systems, banking, innovation studies, public policy, consumer behavior, and technology governance.

The rapid expansion of this literature has generated several bibliometric and review studies, but their scopes remain fragmented. Some map digital financial inclusion as a distinct research stream (Gallego-Losada et al., 2023), others focus on FinTech, digitalization, and financial services more broadly (Bhatt et al., 2022). Still, others review mobile money, mobile FinTech adoption, or financial technology as a pathway to inclusion (Carè et al., 2025; Hornuf et al., 2025; Osabutey & Jackson, 2024). These studies provide valuable intellectual maps, yet the corpus continues to expand rapidly and now includes peripheral themes only a few years ago, such as cybersecurity, digital literacy, algorithmic decision-making, green finance, and systemic credit exposure. A bibliometric design that explicitly tracks thematic evolution can therefore show not only which themes are prominent, but how the field's structure changes over time.

This study addresses that need by mapping the Scopus-indexed literature connecting financial inclusion with FinTech-driven digital financial innovation from 2016 to 2026. Compared with technology-specific reviews or static bibliometric snapshots, the analysis integrates performance analysis, geographic productivity, a harmonized keyword structure, VOSviewer co-occurrence mapping, cited-reference and cited-author co-citation analysis, and normalized thematic evolution across three periods. This combination makes it possible to examine not only who produces and cites the literature, but also the intellectual traditions the field draws on, the conceptual relationships that organize current research, and the direction in which the knowledge base is moving.

Accordingly, the study addresses four research questions:
RQ1. How has digital financial inclusion research evolved in publication volume, citation influence, and publication outlets between 2016 and 2026?
RQ2. What conceptual and intellectual structures organize the field, and how do its major economic, technological, and institutional research traditions intersect?
RQ3. How have thematic priorities shifted across 2016-2020, 2021-2023, and 2024-2026, and which themes have emerged, persisted, or declined?
RQ4. What research gaps and economic-policy priorities follow from the observed conceptual and thematic evolution of digital financial inclusion?

The objective is to provide an integrated, time-sensitive map of the literature rather than an assessment of individual intervention effects. The study contributes a document-normalized comparison of three publication periods, triangulated with keyword and co-citation networks, to distinguish sustained foundations from emerging research priorities. Its novelty lies in linking the field’s changing vocabulary to its economic, technological, and governance-related knowledge bases within a single reproducible corpus. This synthesis is relevant to research design and to policies that distinguish access to digital services from safe and meaningful financial participation.

LITERATURE REVIEW

Digital financial inclusion should be distinguished from both conventional financial inclusion and the mere digitization of banking. Its analytical components include access, actual usage, affordability, service quality, safety, financial capability, and welfare outcomes. Composite-measurement research demonstrates why these dimensions

should not be conflated: indicators of connectivity or account ownership do not capture the reliability and value of digital financial participation (Khera et al., 2022). Financial inclusion research has also examined the household-consumption consequences of digital finance, indicating that the meaning of inclusion extends beyond service uptake (Li et al., 2020). The resulting conceptual question concerns the mechanisms by which access and usage generate welfare gains rather than merely higher transaction volumes.

Technology Adoption, Capability, and Institutional Context

Technology-acceptance and innovation-diffusion perspectives explain why perceived usefulness, ease of use, and social or organizational conditions can shape the uptake of financial technologies. However, adoption is only one stage in a broader pathway toward inclusion. A systematic review and meta-analysis of mobile FinTech in Sub-Saharan Africa emphasizes adoption drivers but also points to contextual heterogeneity (Hornuf et al., 2025). Empirical findings link security, convenience, privacy, trust, and satisfaction with FinTech service use (Kee et al., 2024). Research on e-wallet-related financial well-being also highlights the importance of financial literacy beyond digital use alone (Kee et al., 2025). Evidence from Indonesian microenterprises similarly links e-wallet use with financial literacy and business performance (Munfaqiroh et al., 2026). These studies motivate an integrated view of technology use, capability development, and outcomes.

Previous Reviews and Bibliometric Evidence

Existing reviews reveal distinct but overlapping knowledge domains. Gallego-Losada et al. (2023) visualize the digital financial inclusion literature, whereas Bhatt et al. (2022) examine the broader intersection of FinTech, digitalization, and financial services. Other studies synthesize FinTech as a pathway to inclusion (Carè et al., 2025), the mobile-money evidence in Africa (Osabutey & Jackson, 2024), or determinants of mobile FinTech adoption (Hornuf et al., 2025). The variation in technologies, theoretical emphases, and inclusion outcomes limits comparability across these bodies of research. It also suggests that a static list of prolific articles or authors cannot fully explain the direction of conceptual change.

Rationale for Integrated Science Mapping

Co-occurrence analysis locates the concepts that organize a research field, whereas co-citation mapping identifies the knowledge traditions jointly used by subsequent studies. Longitudinal thematic analysis complements these network approaches by distinguishing persistent concepts from emerging emphases. Since annual publication output is uneven, raw keyword counts can misrepresent the salience of recent terms. The present study therefore combines performance, conceptual, and intellectual maps with keyword prevalence expressed per 100 documents in each period. This design describes changes in research attention; it does not establish the effectiveness of the technologies or the causal effects of policy interventions.

RESEARCH METHOD

Study Design and Database

This study adopted a quantitative bibliometric and science-mapping design to analyze the development and structure of research on FinTech-driven digital financial inclusion. Scopus provided document-level bibliographic metadata, citation counts, author keywords, publication-source information, and affiliation data in a consistent export format. The search and export were completed on September 9, 2026. The unit of analysis was each indexed document retrieved by the final search query.

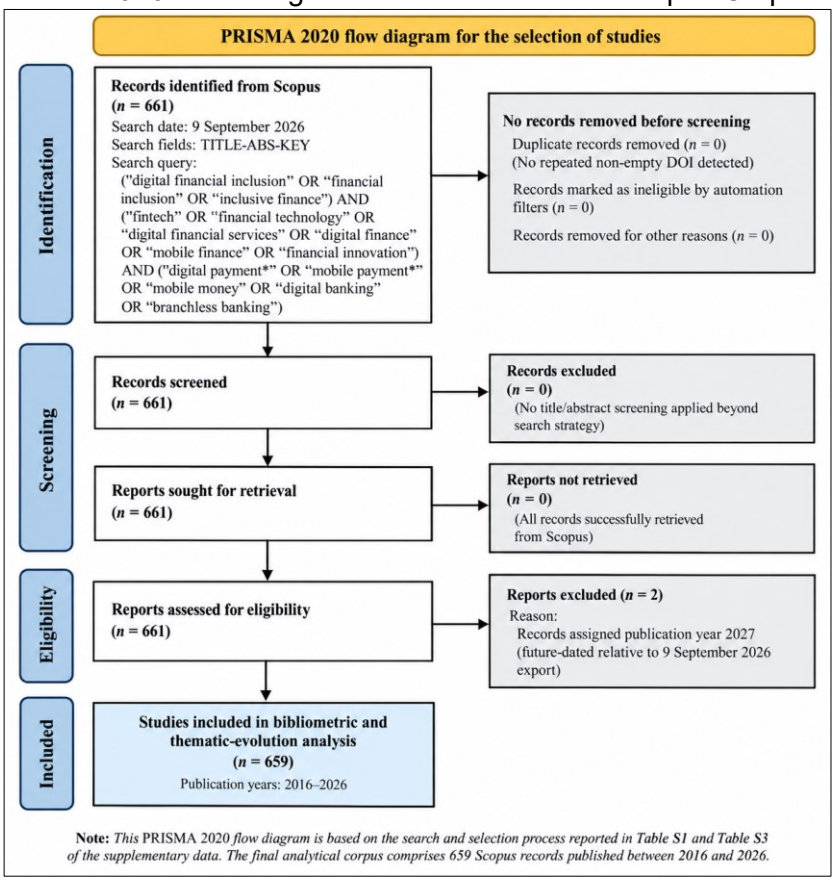
Search Strategy

The Scopus query was: TITLE-ABS-KEY (("digital financial inclusion" OR "financial inclusion" OR "inclusive finance") AND ("FinTech" OR "financial technology" OR "digital financial services" OR "digital finance" OR "mobile finance" OR "financial innovation") AND ("digital payment*" OR "mobile payment*" OR "mobile money" OR "digital banking" OR "branchless banking")). This query required the intersection of inclusion, FinTech or digital finance, and digitally mediated payments or banking. The Scopus export did not preserve the search-history interface; consequently, intermediate retrieval counts that could not be verified were not reported. The selection sequence begins with the complete final exported dataset.

Data Screening, Cleaning, and Eligibility

The final Scopus search produced 661 records for screening and eligibility assessment. The selection process is summarized in an adapted Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 flow diagram (Figure 1). All 661 records were screened, with no additional title or abstract exclusions beyond the final query and no records unavailable for eligibility assessment. Two records were assigned a publication year of 2027, despite the September 9, 2026 export date. These future-dated records were excluded for temporal consistency, leaving 659 documents published from 2016 to 2026. No repeated nonempty DOI values were identified. One similar-title pair concerning “One Cash” was retained because the records represented distinct conference outputs. The analytical corpus included articles, book chapters, conference papers, reviews, books, conference reviews, one data paper, and one note.

Figure 1. PRISMA 2020 Flow Diagram for Selection of the Scopus Corpus



Performance and Citation Analysis

Quantitative performance analysis summarized annual publication output, accumulated citations, document types, publication sources, authors, affiliation countries, and

influential documents. Citation counts were treated as indicators of visibility rather than methodological quality. Recent documents, especially those published in 2025 and the incomplete 2026 year, were interpreted with attention to citation lag. Author productivity was reported alongside citation totals and a corpus-specific h-index calculated only from the study dataset.

Country Productivity Analysis
Geographic productivity was derived from affiliation strings using full counting: each document contributed to every country or territory represented by its authors' affiliations. Country metadata were identifiable in 650 of the 659 documents. Publication and citation totals were summarized by affiliation country. Full counting describes geographic participation and must not be interpreted as fractional national contributions or as the geographic location of research subjects.

Keyword Co-Occurrence and VOSviewer Conceptual Mapping
Author keywords were examined using two complementary quantitative procedures. First, metadata were harmonized to support frequency and temporal comparisons. Seventy-five records lacked author keywords; therefore, this component used 584 documents. Terms were lowercased, trimmed, and standardized across clear lexical variants, including "financial technology"/"FinTech," singular/plural digital payments, "AI"/"artificial intelligence," and central bank digital currency variants. After harmonization, 1,513 unique author keywords remained. Second, VOSviewer visualized the connected co-occurrence network. Node size indicates term weight; links represent co-occurrence; distance indicates relatedness; and colors represent detected clusters. For interpretation, closely related network communities were grouped into three broader conceptual domains.

Co-Citation Mapping
VOSviewer co-citation analysis was conducted to identify intellectual foundations at two levels: cited references and cited authors. Co-citation occurs when the same source document cites two references or authors together. The cited-reference map identified clusters of foundational works, while the cited-author map identified broader disciplinary and theoretical traditions. Larger nodes indicate greater co-citation weight, stronger links indicate more frequent co-citation relationships, shorter distances indicate greater intellectual relatedness, and colors indicate VOSviewer clusters. These quantitative analyses complement the document-level citation ranking because they reveal the knowledge base on which the corpus collectively depends rather than only the most cited documents within the corpus.

Thematic Evolution
Thematic evolution was evaluated across three periods selected to reflect the empirical publication pattern: 2016–2020, 2021–2023, and 2024–2026. Because publications increased steeply across periods, raw keyword counts would overstate the prominence of recent topics. Thematic prevalence was therefore expressed as occurrences per 100 documents in each period. The analysis focused on recurring and emerging terms associated with the core inclusion-finance relationship, including financial inclusion, FinTech, mobile money, digital payments, digital finance, digital financial inclusion, financial literacy, digital literacy, artificial intelligence, blockchain, digital banking, Unified Payments Interface (UPI), cybersecurity, sustainable development, and sustainable finance.

Scope of Inference
This quantitative study is descriptive and relational, rather than causal or evaluative. It maps publication activity, citation visibility, affiliation-based geographic productivity,

conceptual structure, intellectual foundations, and thematic evolution. It does not evaluate the quality or causal validity of individual studies. No publication-bias test was appropriate because the dataset did not comprise effect estimates from a meta-analysis. All reported quantitative findings derive from the cleaned Scopus corpus and the analytic procedures described above.

RESULTS

Corpus Profile and Publication Growth

Table 1. Descriptive Profile of the Cleaned Scopus Corpus

Indicator	Value
Analytical documents	659
Publication years	2016–2026
Unique named authors	1,820
Publication sources	443
Total Scopus citations	8,672
Mean citations/document	13.16
Median citations/document	2
Uncited documents	248 (37.6%)
Records with author keywords	584
Unique harmonized author keywords	1,513
Records with detected country metadata	650
Countries/territories detected	108

Table 1 shows that the final analytical corpus comprised 659 documents published between 2016 and 2026. These documents were authored by 1,820 unique named authors and distributed across 443 publication sources. At the export date, the corpus had accumulated 8,672 Scopus citations, corresponding to a mean of 13.16 citations per document and a median of two. Citation distribution was highly skewed: 248 documents (37.6%) were uncited, whereas a small set of influential documents accounted for a large share of accumulated citations. Author-keyword metadata were available for 584 documents, and country or territory information was detected for 650 records.

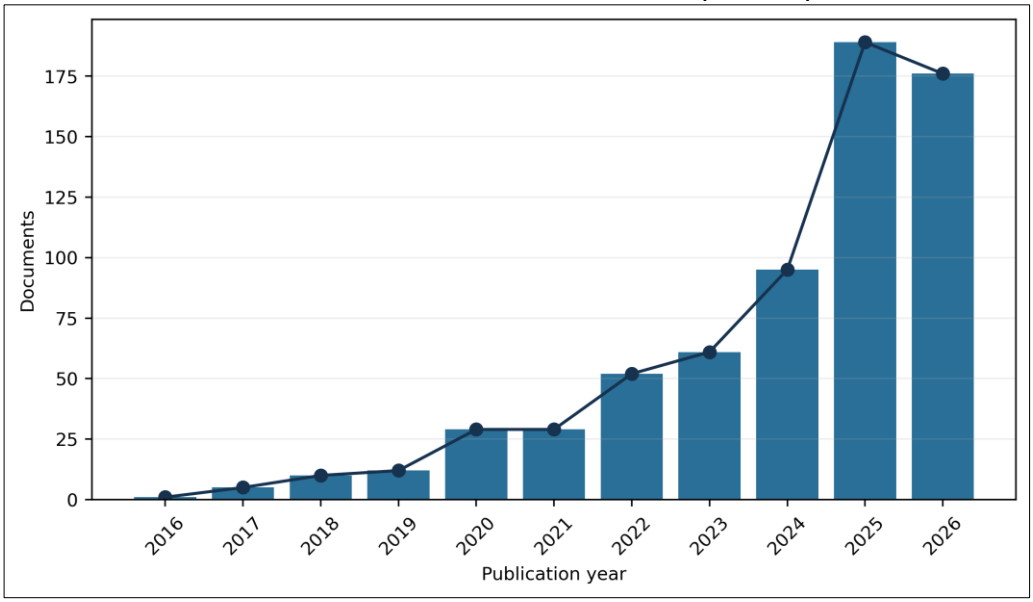
Table 2. Annual Scientific Production and Citations at the Export Date

Year	Documents	Citations at export
2016	1	8
2017	5	137
2018	10	250
2019	12	437
2020	29	2034
2021	29	635
2022	52	1775
2023	61	1884
2024	95	749
2025	189	671
2026	176	92

Table 2 shows that scientific production expanded sharply across the study period. Output increased from one record in 2016 to five in 2017, 10 in 2018, 12 in 2019, and 29 in 2020. After remaining at 29 records in 2021, output rose to 52 in 2022, 61 in 2023, 95 in 2024, and 189 in 2025. By 9 September 2026, the corpus already contained 176 records for 2026. Thus, 460 of the 659 documents (69.8%) were published during 2024–

2026, confirming that the field has entered a phase of rapid expansion. Figure 2 visualizes the publication trajectory.

Figure 2. Annual Scientific Production in the Cleaned Scopus Corpus, 2016–2026



The annual citation pattern differs from publication growth because older documents have had more time to accumulate citations. Documents published in 2020 collectively received 2,034 citations, while the 2022 and 2023 cohorts accumulated 1,775 and 1,884 citations, respectively. In contrast, the much larger 2025 and 2026 cohorts had accumulated 671 and 92 citations at the export date. These figures should therefore not be interpreted as evidence that recent scholarship is less influential; they primarily illustrate the temporal asymmetry inherent in citation-based indicators.

Document Types

Table 3. Distribution of Document Types in the Analytical Corpus

Document type	Records	Share
Article	391	59.3%
Book chapter	137	20.8%
Conference paper	97	14.7%
Review	22	3.3%
Book	8	1.2%
Conference review	2	0.3%
Data paper	1	0.2%
Note	1	0.2%

Table 3 shows that journal articles were the dominant document type, accounting for 391 records (59.3%). Book chapters contributed 137 records (20.8%), while conference papers accounted for 97 (14.7%). Reviews represented 22 documents (3.3%), followed by books (1.2%), conference reviews (0.3%), one data paper, and one note. The substantial representation of book chapters and conference papers indicates that the field is not confined to conventional finance journals; knowledge also circulates through technology conferences and edited volumes, which is consistent with the interdisciplinary and rapidly changing nature of digital financial innovation.

Productive Sources and Authors

Figure 3. Most Productive Publication Sources in the 2016–2026 Corpus

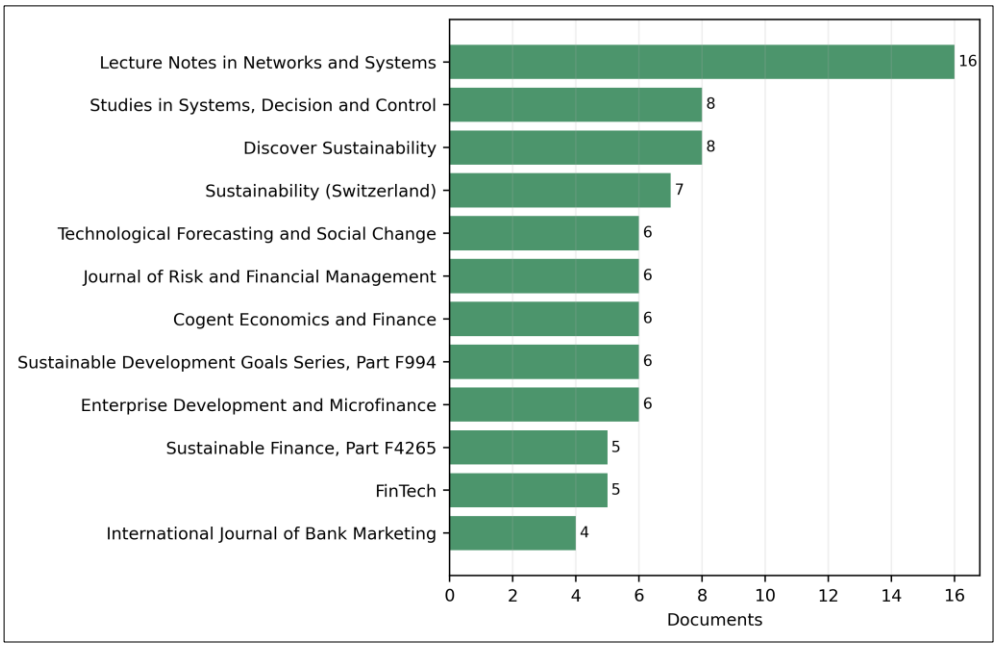


Table 4. Leading Publication Sources and Citation Impact

Rank	Source	Documents	Citations
1	Lecture Notes in Networks and Systems	16	18
2	Discover Sustainability	8	22
3	Studies in Systems, Decision and Control	8	6
4	Sustainability (Switzerland)	7	317
5	Technological Forecasting and Social Change	6	517
6	Journal of Risk and Financial Management	6	163
7	Cogent Economics and Finance	6	101
8	Enterprise Development and Microfinance	6	40
9	Sustainable Development Goals Series, Part F994	6	8
10	FinTech	5	46
11	Sustainable Finance, Part F4265	5	7
12	International Journal of Bank Marketing	4	167

Table 4 shows that source productivity was highly dispersed across 443 outlets. Lecture Notes in Networks and Systems was the most productive source with 16 documents, followed by Discover Sustainability and Studies in Systems, Decision and Control with eight each. Sustainability (Switzerland) published seven records, while Technological Forecasting and Social Change, Journal of Risk and Financial Management, Cogent Economics and Finance, Enterprise Development and Microfinance, and the Sustainable Development Goals Series each contributed six. Figure 3 visualizes the leading sources, and Table 4 combines source productivity with citation totals. Importantly, productivity and influence did not coincide: Technological Forecasting and Social Change accumulated 517 citations from six records, whereas several higher-volume series had comparatively modest citation totals.

Table 5. Most Productive Authors in the Corpus

Rank	Author	Documents	Citations	Corpus h-index
1	Okello Candiya Bongomin, George	5	222	5
2	Coffie, Cephas Paa Kwasi	5	176	4
3	Osabutey, Ellis L.C.	4	486	4
4	Razaq, Lubna	4	74	3
5	Yakubu, Ibrahim Nandom	4	4	1

6	Ozili, Peterson K.	3	187	2
7	Anderson, Richard	3	71	3
8	Sadik, Nafis	3	21	2
9	Iddrisu, Khadijah	3	3	1
10	Vasudevan, Asokan	3	2	1
11	Kumar, Rakesh	3	1	1
12	Senyo, P.K.	2	472	2
13	Glavee-Geo, Richard	2	231	2
14	Karjaluoto, Heikki	2	231	2
15	Shaikh, Aijaz A.	2	231	2

Table 5 shows that author productivity was similarly dispersed. George Okello Candiya Bongomin and Cephas Paa Kwasi Coffie were the most prolific authors in the corpus with five documents each. Ellis L. C. Osabutey and several other authors followed with four or three documents. Corpus-specific h-indices reinforce the distinction between output volume and impact. Bongomin achieved a corpus h-index of five, while Osabutey had four highly cited contributions despite fewer publications.

Country Productivity and Citation Impact

Figure 4. Leading Countries/territories by Document Output using Full Counting

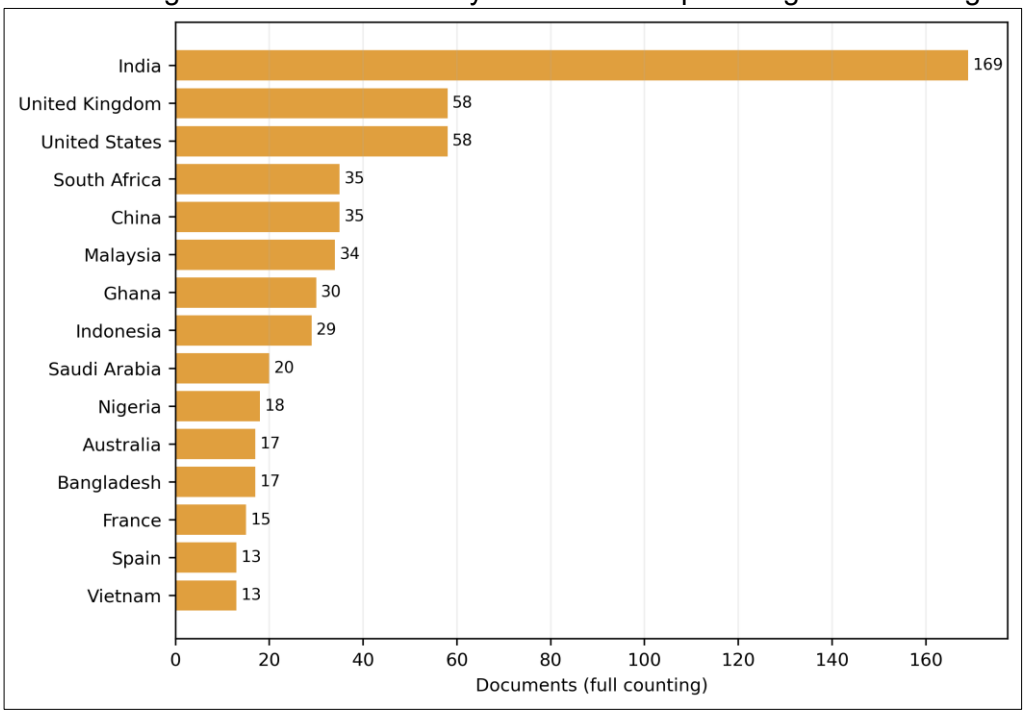


Table 6. Leading Countries/territories by Publication Output and Citation Impact

Rank	Country	Documents	Citations
1	India	169	1059
2	United States	58	2367
3	United Kingdom	58	1778
4	China	35	1398
5	South Africa	35	519
6	Malaysia	34	267
7	Ghana	30	441
8	Indonesia	29	171
9	Saudi Arabia	20	243
10	Nigeria	18	543
11	Australia	17	364
12	Bangladesh	17	73
13	France	15	171
14	Vietnam	13	222
15	Spain	13	176

Table 6 shows that India appeared most frequently, with 169 records. The United States and United Kingdom followed with 58 each, then China and South Africa with 35 each, Malaysia with 34, Ghana with 30, Indonesia with 29, Saudi Arabia with 20, and Nigeria with 18. Figure 4 shows the leading countries and territories, while Table 6 reports their publication volume and citation totals. Citation impact differed from output: the United States accumulated 2,367 citations and the United Kingdom 1,778, compared with 1,059 for India. China also achieved 1,398 citations from 35 documents. These descriptive values reflect author-affiliation representation rather than the country in which research was conducted; publication frequency and cumulative citation visibility also differ.

Most Influential Documents

Table 7. Fifteen Most Cited Documents in the Corpus

Rank	Document	Year	Source	Citations	DOI
1	The impact of digital finance on household consumption: Evidence from China	2020	Economic Modelling	790	10.1016/j.econmod.2019.09.027
2	Unearthing antecedents to financial inclusion through FinTech innovations	2020	Technovation	345	10.1016/j.technovation.2020.102155
3	The Global Findex Database 2017: Measuring Financial Inclusion and Opportunities to Expand Access to and Use of Financial Services	2020	World Bank Economic Review	310	10.1093/wber/lhz013
4	Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China	2022	Journal of International Money and Finance	304	10.1016/j.jimonfin.2022.102625
5	The Role of FinTech in Driving Financial Inclusion in Developing and Emerging Markets: Issues, Challenges and Prospects	2023	Technological Sustainability	188	10.1108/TECHS-10-2021-0017
6	Mobile money as a driver of digital financial inclusion	2023	Technological Forecasting and Social Change	162	10.1016/j.techfore.2022.122158
7	Measuring Digital Financial Inclusion in Emerging Market and	2022	Asian Economic Policy Review	154	10.1111/aepr.12377

	Developing Economies: A New Index				
8	Central bank digital currency research around the world: a review of literature	2023	Journal of Money Laundering Control	153	10.1108/JMLC-11-2021-0126
9	Attaining Sustainable Development Goals through Financial Inclusion: Exploring Collaborative Approaches to FinTech Adoption in Developing Economies	2023	Sustainability (Switzerland)	151	10.3390/su151713039
10	FinTech ecosystem practices shaping financial inclusion: the case of mobile money in Ghana	2022	European Journal of Information Systems	127	10.1080/0960085X.2021.1978342
11	Fintech and Financial Inclusion in Southeast Asia and India	2022	Asian Economic Policy Review	125	10.1111/aepr.12379
12	The Potential of FinTech in Enabling Financial Inclusion	2019	Extending Financial Inclusion in Africa	107	10.1016/B978-0-12-814164-9.00014-1
13	Assessing the impact of mobile money on improving the financial inclusion of Nairobi women	2022	Journal of Gender Studies	105	10.1080/09589236.2021.1884536
14	Mobile payments in India: the privacy factor	2019	International Journal of Bank Marketing	102	10.1108/IJBM-05-2017-0099
15	Determinants of FinTech Payment Services Diffusion by SMEs in Sub-Saharan Africa: Evidence from Ghana	2021	Information Technology for Development	100	10.1080/02681102.2020.1840324

Table 7 shows that citation analysis identified a small set of highly influential documents. The most cited record was Li et al.'s study of digital finance and household consumption in China, with 790 citations. It was followed by Senyo and Osabutey's study of antecedents to financial inclusion through FinTech innovations (345 citations) and the Global Findex-based article by Demirgüç-Kunt and colleagues (310 citations). Research on FinTech, cryptocurrencies, and CBDCs in China accumulated 304 citations, while a developing-market review of FinTech and financial inclusion accumulated 188. Other citation anchors addressed mobile money as a driver of digital financial inclusion, measurement of digital financial inclusion, CBDC research, the SDGs, FinTech ecosystems in Ghana, and financial inclusion in Southeast Asia and India.

Author-Keyword Structure and Conceptual Clusters

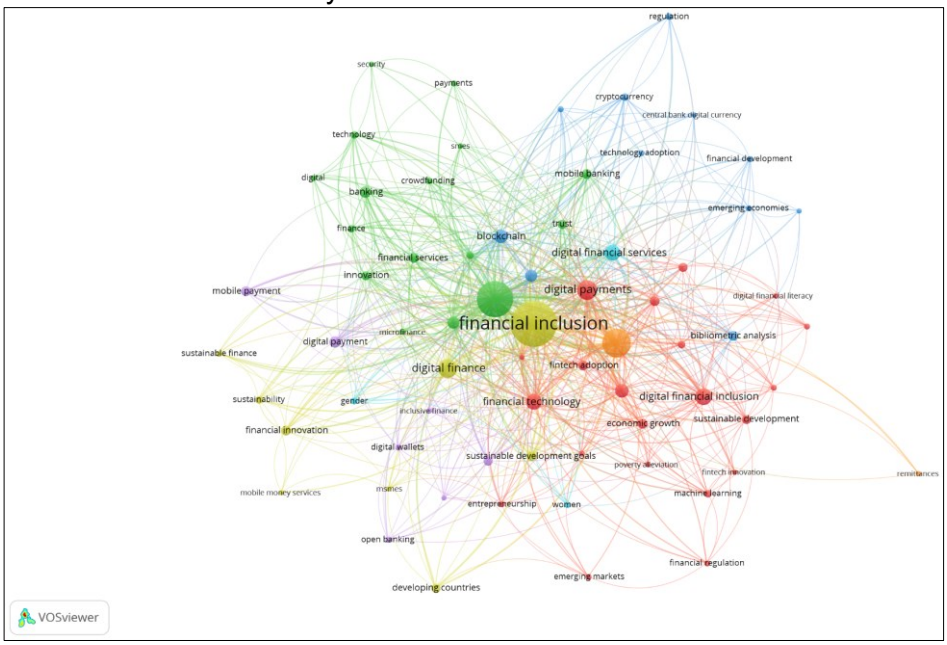
Table 8. Most Frequent Harmonized Author Keywords

Rank	Keyword	Documents	Share of corpus
1	financial inclusion	336	51.0%
2	fintech	243	36.9%
3	mobile money	131	19.9%
4	digital payments	84	12.7%
5	digital finance	57	8.6%
6	digital financial inclusion	45	6.8%
7	digital financial services	40	6.1%
8	mobile payments	31	4.7%
9	blockchain	30	4.6%

10	financial literacy	29	4.4%
11	artificial intelligence	25	3.8%
12	digital banking	23	3.5%
13	banking	21	3.2%
14	sustainable development goals	20	3.0%
15	Africa	20	3.0%
16	fintech adoption	17	2.6%
17	digital literacy	17	2.6%
18	mobile banking	17	2.6%
19	bibliometric analysis	16	2.4%
20	financial innovation	16	2.4%
21	financial services	15	2.3%
22	economic growth	15	2.3%
23	India	15	2.3%
24	developing countries	14	2.1%
25	digitalization	14	2.1%

Table 8 shows that author-keyword frequencies reveal the field's intellectual core. Financial inclusion occurred in 336 documents (51.0% of the corpus), followed by FinTech in 243 (36.9%) and mobile money in 131 (19.9%). Digital payments appeared in 84 documents, digital finance in 57, digital financial inclusion in 45, and digital financial services in 40. Other prominent terms included mobile payments, blockchain, financial literacy, artificial intelligence, digital banking, sustainable development goals, Africa, FinTech adoption, digital literacy, mobile banking, bibliometric analysis, financial innovation, economic growth, India, developing countries, and digitalization.

Figure 5. VOSviewer Author-Keyword Co-Occurrence Network



Note. Node size reflects keyword weight, links indicate co-occurrence relationships, and colors indicate VOSviewer clusters.

Table 9. Conceptual Clusters Identified from the Author-Keyword Co-Occurrence Network

Cluster	Working label	Representative terms	Interpretive meaning

1	Inclusive FinTech ecosystems and development	financial inclusion; fintech; mobile money; mobile payments; digital banking; SDGs; financial innovation; economic growth; digitalization; trust; gender	Technology-enabled inclusion linked to development outcomes, access, trust, and socio-economic transformation.
2	Digital-payment adoption and capability infrastructure	digital payments; digital financial inclusion; digital financial services; financial literacy; fintech adoption; mobile banking; digital literacy; UPI; COVID-19; cybersecurity	Adoption, usage, capability, trust/security, and infrastructure conditions shaping actual participation in digital finance.
3	Technology-frontier financial innovation	digital finance; blockchain; artificial intelligence; sustainable development; cryptocurrency; CBDC; machine learning; crowdfunding	New digital architectures and data-intensive technologies extending inclusion research into programmable, automated, and sustainability-linked finance.

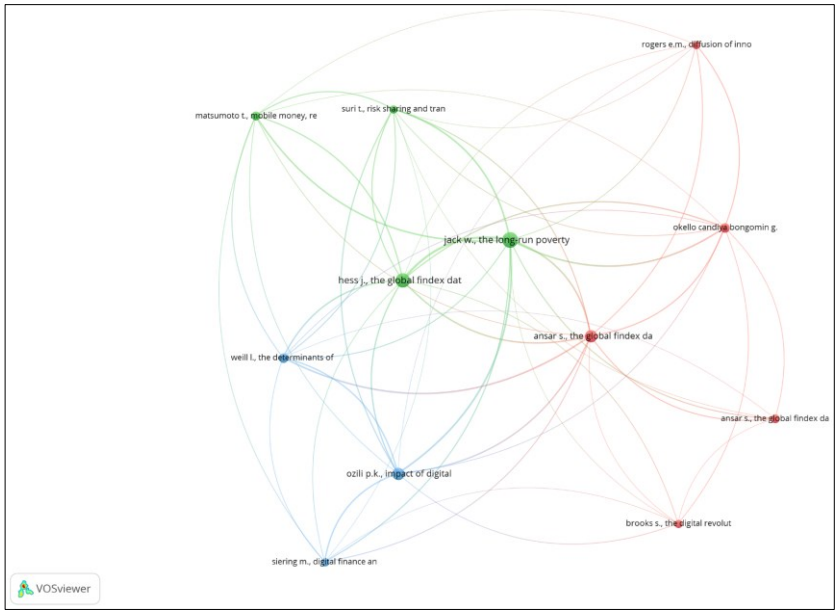
Table 9 summarizes the three interpreted conceptual domains. The VOSviewer author-keyword map (Figure 5) shows a dense conceptual core organized around financial inclusion, FinTech, digital payments, digital financial inclusion, digital finance, financial technology, and digital financial services. Around this core, the map connects adoption and capability terms (financial and digital literacy, trust, mobile banking, and technology adoption), development-oriented terms (economic growth, poverty alleviation, developing countries, gender, and remittances), and technology- and governance-oriented terms (blockchain, cryptocurrency, central bank digital currency, machine learning, regulation, sustainable finance, open banking, and digital wallets). The VOSviewer communities are more granular than the interpretive synthesis used in this study. For analytical parsimony, closely related clusters were consolidated into three higher-order domains: inclusive FinTech ecosystems and development; digital-payment adoption and capability infrastructure; and technology-frontier financial innovation.

Co-Citation Structure and Intellectual Foundations

The cited-reference co-citation network (Figure 6) is compact but reveals three visible intellectual groupings. One cluster is centered on mobile-money and development-economics evidence, with prominent nodes associated with Suri and Jack, Matsumoto, and Global Findex-related work. A second grouping connects digital finance and determinants of financial inclusion, including visible nodes associated with Ozili, Siering, and Weill. A third grouping links innovation diffusion, digital transformation, and inclusion or governance scholarship, with prominent nodes associated with Rogers, Okello, Candiya Bongomin, and Global Findex-related references. The cross-cluster links indicate that the field does not rest on a single disciplinary tradition; its knowledge base connects household and development evidence, financial-inclusion measurement, and technology or innovation frameworks.

Asia Pacific Journal of Management and Education (APJME)
Vol. 9 No. 3, pp.485-509, November, 2026
E-ISSN: 2655-2035 P-ISSN: 2685-8835
https://www.ejournal.aibpm.org/index.php/APJME

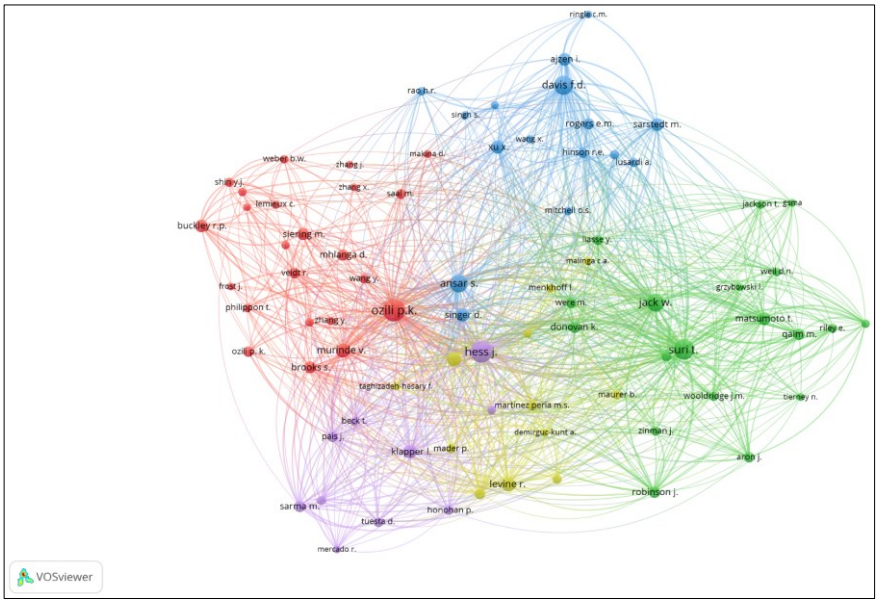
Figure 6. VOSviewer Co-Citation Network of Cited References



Note. Node size reflects co-citation weight; links and proximity indicate intellectual relatedness.

The cited-author co-citation network (Figure 7) is considerably denser and shows stronger convergence among intellectual traditions. Suri and Jack occupy prominent positions in a development and mobile-money cluster; Davis, Ajzen, and Rogers anchor a technology-adoption and diffusion tradition; Ozili, Buckley, Mhlanga, and Siering are prominent in digital-finance, FinTech, and regulatory scholarship; and Demirgüç-Kunt, Levine, Klapper, Hess, and related authors represent financial-inclusion measurement and development research. Bridging nodes, including Ansar and Hess, connect these traditions. The resulting structure suggests that contemporary digital financial inclusion research is best understood as a multidisciplinary field located at the intersection of development economics, financial inclusion measurement, information-systems adoption, innovation diffusion, and digital-finance governance.

Figure 7. VOSviewer Co-Citation Network of Cited Authors.



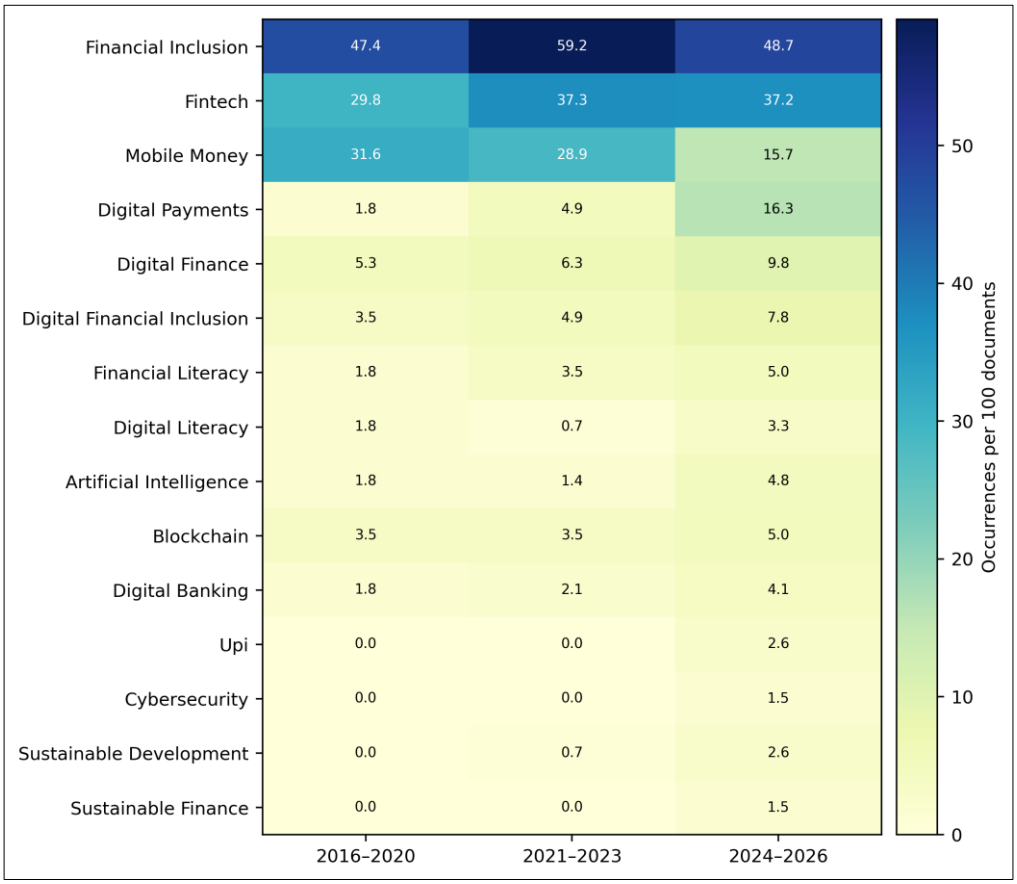
Note. Node size reflects co-citation weight, links indicate co-citation relationships, and colors identify clusters of frequently co-cited authors.

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Thematic Evolution, 2016–2026

The thematic-evolution analysis shows a clear transition in emphasis. During 2016–2020, financial inclusion, FinTech, and mobile money were the dominant terms, while digital payments and digital financial inclusion remained comparatively minor. During 2021–2023, financial inclusion intensified further, FinTech remained prominent, and digital finance, digital payments, blockchain, and financial literacy became more visible. Diversification peaked in 2024–2026. Digital payments rose to 16.3 occurrences per 100 documents; digital finance to 9.8; digital financial inclusion to 7.8; financial literacy to 5.0; artificial intelligence to 4.8; digital banking to 4.1; and digital literacy to 3.3. UPI, cybersecurity, sustainable development, and sustainable finance also emerged as distinct recent themes. Figure 8 visualizes these changes.

Figure 8. Thematic Evolution Based on Author-Keyword Prevalence per 100 Documents across Three Publication Periods



The direction of change is as important as the absolute frequency of individual terms. Mobile money remained a major topic but declined from 31.6 occurrences per 100 documents in 2016–2020 to 15.7 in 2024–2026. FinTech remained stable at a high level, while the field's vocabulary broadened to include payment infrastructures, capabilities, data-intensive technologies, and sustainability. The evidence therefore supports a three-stage interpretation: a foundation phase dominated by mobile-money-enabled access; an expansion phase incorporating digital finance, payment systems, and financial literacy; and an ecosystem phase in which inclusion is increasingly examined through interoperable payment infrastructures, AI, digital capability, cybersecurity, sustainability, and governance.

DISCUSSION

From Mobile-Money Access to a Digital Financial Ecosystem

The first major finding is that FinTech-driven financial inclusion has evolved from a relatively narrow access problem into an ecosystem problem. Earlier research frequently treated mobile money as the central technological mechanism through which unbanked users could enter formal or semi-formal financial systems. That emphasis is understandable: mobile money has been described as a mechanism for reducing transaction frictions and broadening financial participation (Shaikh et al., 2023), while conceptual and empirical work positioned mobile money agents as crucial intermediaries in digital inclusion (Shaikh et al., 2023). However, ecosystem research demonstrates that financial inclusion depends on coordinated practices among FinTech firms, incumbents, agents, regulators, and users (Senyo et al., 2022). The bibliometric shift from mobile money toward digital payments, digital financial services, digital banking, AI, and cybersecurity is consistent with this broader understanding.

The expansion is also visible in the geographic and institutional literature. Africa remains foundational to the intellectual history of mobile money, and recent reviews continue to identify the continent as a major site of both innovation and unresolved inclusion challenges (Osabutey & Jackson, 2024). Research on Ghana shows that FinTech market development involves heterogeneous actors whose contributions extend beyond ICT infrastructure (Coffie & Hongjiang, 2023), while the evolution of Africa's FinTech entrepreneurial ecosystem has been described as a transition from mobile money to digital finance and then to more diversified FinTech innovation (Osabutey & Jackson, 2024). At the same time, critical work warns that the distributional consequences of FinTech booms may diverge from optimistic inclusion narratives (Akolgo, 2023). The bibliometric results mirror this tension: African countries remain visible in the geographic productivity profile, while India now accounts for the field's largest publication volume, reflecting the growing importance of South Asian digital-payment infrastructures and policy experiments.

Geography, Infrastructure, and the Diffusion of Digital Payments

Research in Indonesia links financial literacy, inclusion, and digital payment use with financial well-being (Muat et al., 2025), while FinTech studies identify privacy and security as conditions for trust and continued adoption (Kee et al., 2024). These findings help explain why UPI appears only in the most recent thematic period yet grows quickly as a research term. The emergence of UPI within the 2024–2026 cluster signals a shift from studying mobile finance as a single service toward examining interoperable payment rails as infrastructure for an entire digital ecosystem. India’s leading author-affiliation publication count aligns with the country's rapid development of digital payment systems and its use as a laboratory for studying adoption, digital financial inclusion, and consumer behavior.

Capability, Adoption, and Distributional Inclusion

The second major finding is the rising importance of user capability. Financial inclusion cannot be inferred from the existence of a digital channel. Adoption research repeatedly shows that perceived usefulness, ease of use, trust, security, and financial awareness influence whether users engage with FinTech services (Al-Okaily et al., 2023; Senyo & Osabutey, 2020). In Sub-Saharan Africa, the meta-analytic evidence reinforces the centrality of usefulness and ease of use while noting gaps in understanding broader contextual determinants (Hornuf et al., 2025). Digital financial literacy extends this argument by combining financial knowledge with the skills needed to navigate digital interfaces, understand risks, and evaluate online financial choices (Mpofu, 2023). The rise of both financial literacy and digital literacy in the thematic-evolution analysis therefore represents more than a change in terminology; it reflects a conceptual shift from access to effective, informed use. Evidence from Indonesian microenterprises

associates e-wallet adoption and financial literacy with business performance (Munfaqiroh et al., 2026), while consumer studies identify ease of use, security, and trust as important conditions for FinTech adoption (Kee et al., 2024).

Recent work also suggests that capability may condition the distributional effects of digital finance. Mobile money can reduce exclusion by enabling remittances, payments, and financial autonomy in contexts where formal financial access is constrained (Kim, 2022). The SAARC evidence further indicates that gender, education, income, employment, and rural residence are associated with digital financial inclusion, with substantial cross-country variation (Chowdhury et al., 2026). These studies support a future research agenda that analyses digital capability alongside structural inequalities rather than as an isolated individual attribute. Chowdhury et al. (2026) identify socioeconomic factors, including gender and education, associated with financial inclusion across SAARC countries.

Consistent evidence from previous studies strengthens this distinction between access and beneficial use. Kee et al. (2024) emphasize trust and service security in FinTech satisfaction; Kee et al. (2025) link e-wallet use, literacy, and well-being; and Munfaqiroh et al. (2026) examine digital transactions and financial performance among Indonesian microenterprises. These studies address user-level mechanisms that publication maps alone cannot establish, highlighting a productive direction for integrating adoption, capability, and outcome research.

Trust, Cybersecurity, Consumer Protection, and Governance

A third finding is the movement of trust, security, and consumer protection from peripheral adoption variables toward core ecosystem conditions. Recent empirical studies associate service security, privacy, and trust with satisfaction and willingness to use FinTech services (Kee et al., 2024). The downside of neglecting these safeguards is visible in qualitative research documenting fraud, service failure, stakeholder conflict, and other 'dark side' experiences in mobile money ecosystems (Mogaji & Nguyen, 2022). More recent work connects cybersecurity awareness, trust, and digital literacy directly with digital banking adoption (Doghan & Mirzaliev, 2024). The emergence of cybersecurity in the 2024–2026 thematic period is therefore consistent with the field's maturation: as transactions become more digital and data-intensive, protection from fraud, privacy loss, identity compromise, and opaque automated decisions becomes integral to inclusion itself.

This governance perspective complicates policy narratives that equate digitalization with inclusion. Recent African mobile-money research underscores the significance of regulation and market conditions for innovation (Osabutey & Jackson, 2024). Other research suggests that regulatory choices, user trust, and consumer safeguards shape the risks and rewards of digital participation (Kee et al., 2024; Osabutey & Jackson, 2024). Research in developing and emerging markets similarly calls for coordination among governments, financial institutions, and FinTech firms to address persistent barriers (Ediagbonya & Tioluwani, 2023). The bibliometric emergence of cybersecurity, digital literacy, and regulatory themes suggests that the next generation of digital financial inclusion research will need to evaluate not only whether regulation enables innovation, but whether it also protects users and preserves fair participation across increasingly complex platforms.

AI, Programmable Finance, and the Technology Frontier

A fourth major development is the extension of inclusion research toward technology-frontier financial innovation. The co-occurrence cluster containing blockchain, artificial intelligence, cryptocurrency, CBDC, machine learning, and crowdfunding indicates that

the field is no longer limited to mobile interfaces or payment channels. Allen et al. (2022) describe how FinTech, cryptocurrencies, and CBDC are transforming the structure of China's financial system and generating new regulatory questions. Ozili's review similarly shows that CBDCs are often justified in terms of financial inclusion and payment efficiency but require careful design (Ozili, 2023). The growth of artificial intelligence in 2024–2026 suggests that inclusion research is increasingly concerned with data-driven credit assessment, fraud detection, personalization, and automated decision systems.

The implications of this technological frontier are ambivalent. AI and alternative-data models may reduce information asymmetry and extend services to users with limited formal credit histories, but they can also create new forms of exclusion if data are incomplete, biased, or difficult to contest. Although the present bibliometric corpus shows rapid growth of AI-related terms, the co-occurrence structure indicates that governance and capability themes have not yet fully converged with the technology-frontier cluster. This separation is a substantive research gap. Future studies should connect AI-enabled finance with questions of explainability, digital redress, algorithmic bias, and differential access across gender, age, rurality, disability, and income. The goal should be to determine whether intelligent financial systems expand meaningful inclusion or merely automate existing inequalities.

Sustainability, Financial Health, and Resilience

The fifth major development is the stronger connection between digital finance and sustainability. FinTech is increasingly discussed as a tool for achieving the SDGs, particularly where digital channels can reduce access barriers and mobilize finance in developing economies (Danladi et al., 2023). Recent empirical work goes further by examining whether digital finance supports green technology innovation through reduced financing constraints (Sreenu, 2025) and whether digital financial inclusion contributes to sustainable-development outcomes across multiple SDG dimensions (Kattan-Rodríguez & Galindo-Manrique, 2025). This emerging link is also visible in the bibliometric rise of sustainable development and sustainable finance in 2024–2026. However, the conceptual mechanisms remain heterogeneous. Sustainability may refer to financial-system durability, social inclusion, environmental finance, or long-term welfare, and these meanings should be distinguished more carefully in future research.

Financial health and resilience provide a useful bridge between inclusion and sustainability. Digital finance can affect consumption and household welfare, as shown by the highly cited evidence from China (Li et al., 2020), but increased digital participation does not automatically imply improved financial health. Research in Vietnam connects FinTech adoption and financial literacy with consumer financial health during the COVID-19 period (Nathan et al., 2022). Ethnographic work on marginalized Roma households further shows that cashless systems can generate new forms of exclusion when users lack de facto access to digital financial infrastructures and become dependent on others to manage digital transactions (Ravnbøl, 2023). These findings highlight the need to distinguish nominal inclusion from durable improvements in financial resilience, autonomy, and well-being.

Intellectual Foundations and Theoretical Convergence

The co-citation results add an important layer to the thematic findings by showing why the field has become structurally heterogeneous. One intellectual stream is rooted in development economics and mobile-money research concerned with household welfare, poverty reduction, remittances, and access. A second stream is grounded in financial-inclusion measurement and institutional development, while a third draws on technology-adoption and innovation-diffusion theory. More recent digital-finance, FinTech, and regulatory scholarship increasingly connects these traditions. The dense author-level co-

citation network therefore suggests convergence rather than simple thematic proliferation: digital financial inclusion is becoming an interdisciplinary problem in which user adoption, institutional infrastructure, welfare effects, and governance are analyzed within the same knowledge system.

This convergence also clarifies a major opportunity for theory development. Adoption studies frequently explain whether users accept a technology, whereas development-oriented studies are more concerned with whether access changes welfare, resilience, entrepreneurship, or inequality. Future research should connect these levels more explicitly by tracing how technological affordances and adoption mechanisms translate into measurable distributional outcomes under different regulatory and infrastructural conditions. Such integration would move the field beyond parallel literatures on "use" and "impact" toward cumulative explanations of when digital financial innovation produces meaningful inclusion.

Economic and Policy Implications

The thematic transition identified in this study has direct implications for economic policy. First, expanding digital-payment infrastructure should not be treated as equivalent to achieving financial inclusion. Interoperable payment rails, mobile connectivity, and digital accounts can reduce transaction costs and broaden access, but their welfare effects depend on complementary capabilities, affordability, trust, and consumer safeguards. Policy evaluation should therefore distinguish access from effective use and from downstream outcomes such as financial resilience, consumption smoothing, entrepreneurship, and household welfare. This distinction is especially important where rapid digitalization can coexist with fraud exposure, weak redress mechanisms, or unequal digital skills.

Second, the rise of artificial intelligence, digital identity, open finance, real-time payments, and potential CBDC applications changes the policy problem from simple technology diffusion to the governance of digital financial infrastructure. Regulators increasingly need to balance innovation incentives with data protection, cybersecurity, algorithmic accountability, competition, and fair access. The bibliometric separation between technology-frontier themes and capability-governance themes suggests that research has not yet fully integrated these policy dimensions. Economic studies that connect institutional design to distributional outcomes would provide more actionable evidence than adoption measures alone.

Third, the geographic profile points to an important comparative-research opportunity. No post-socialist Central, Eastern, or Southeastern European country appears among the 15 leading author-affiliation countries in Table 6. This descriptive observation does not establish an absence of research on the region; none of the listed affiliation countries belongs to the post-socialist economies of Central, Eastern, or Southeastern Europe, even though these economies are experiencing rapid payment digitalization, banking transformation, and regulatory convergence within or alongside the European Union. Comparative evidence from this region could examine whether findings based predominantly on South Asian and African research contexts also apply to economies with different banking structures, demographic profiles, digital infrastructures, and regulatory institutions. Such work would strengthen the international economic relevance of digital financial inclusion research while addressing a clear geographic gap in the current knowledge base.

Research Gaps and Future Directions

Taken together, the performance, keyword, co-citation, and thematic-evolution results reveal strong publication growth alongside persistent conceptual fragmentation. Terms

such as financial inclusion, digital financial inclusion, FinTech adoption, digital finance, digital payments, and digital financial services overlap but are not interchangeable. Measurement research has responded by developing composite digital financial inclusion indices across emerging and developing economies (Khera et al., 2022), yet variation in indicator construction still limits comparability. Review work likewise notes the breadth and fragmentation of the FinTech-financial inclusion landscape (Carè et al., 2025). A more cumulative research program would separate at least six dimensions: access, usage, quality, affordability, safety, and capability, while linking them to downstream outcomes such as financial health, resilience, enterprise performance, poverty reduction, and inequality.

The findings suggest several priorities for future research. First, measurement should move beyond access and account ownership toward multidimensional digital inclusion indicators that incorporate quality, affordability, safety, capability, and welfare. Second, longitudinal and quasi-experimental designs are needed to determine whether FinTech adoption produces durable gains in resilience, entrepreneurship, consumption smoothing, and poverty reduction. The East African evidence linking mobile money with entrepreneurship through digital savings and credit illustrates the value of analyzing mechanisms rather than only adoption outcomes (Koomson et al., 2023). Third, research should examine unintended harms, including over-indebtedness, fraud, platform dependence, exclusion by algorithm, and privacy loss. Fourth, regulatory research should evaluate how consumer protection, cybersecurity, digital identity, and redress mechanisms interact with innovation incentives.

Fifth, the field should investigate the infrastructural consequences of real-time payments, open finance, digital wallets, embedded finance, and CBDCs. Recent work conceptualizing digital payment ecosystems as socio-technical systems demonstrates that FinTech diffusion may interact with regulatory quality and private-sector credit exposure in ways that extend beyond a simple inclusion narrative (Gün et al., 2026). This perspective is important because digital infrastructures can reshape credit allocation, market power, and systemic risk even when their original policy justification is inclusion. Sixth, sustainability research should test explicit pathways from digital inclusion to green innovation, social inclusion, and SDG outcomes rather than treating sustainability as a general normative label.

CONCLUSION

FinTech-driven financial inclusion research has moved through a marked transition over the past decade. The field began with a strong focus on mobile money and financial access, expanded into digital payments, digital finance, and adoption infrastructure, and is now increasingly organized around an ecosystem that includes digital literacy, artificial intelligence, cybersecurity, interoperable payment systems, regulation, financial resilience, and sustainability. The 659-document Scopus corpus shows both rapid publication growth and growing conceptual diversification, with nearly 70% of records appearing in 2024-2026. Co-citation mapping further shows that this expansion is supported by a multidisciplinary intellectual base linking development and mobile-money research, financial-inclusion measurement, technology-adoption and innovation-diffusion theory, and digital-finance governance.

The central research challenge is therefore no longer whether digital finance can extend access, but under what institutional, technological, and social conditions it produces safe, meaningful, and durable inclusion. Future scholarship should connect infrastructure with capability, innovation with consumer protection, adoption theory with welfare outcomes, AI with accountable governance, and access with measurable financial resilience. For

economic policy, the key implication is that digital inclusion should be assessed as a multidimensional outcome encompassing effective use, affordability, safety, capability, and welfare rather than account or payment access alone. A more integrated ecosystem framework can move the literature beyond fragmented adoption studies toward cumulative evidence on how digital financial innovation redistributes opportunities, risks, and market power across users, firms, and financial systems.

LIMITATION

Several limitations should qualify interpretation. First, the analysis is based only on Scopus and therefore reflects the coverage and indexing practices of that database. Relevant literature indexed exclusively in Web of Science, Dimensions, regional databases, or non-indexed policy repositories may be absent. Second, the final export did not preserve the Scopus search-history interface, so intermediate retrieval and filtering counts could not be reconstructed and were not estimated. Third, 2026 is an incomplete publication year because the Scopus export was performed on 9 September 2026; annual output for 2026 should therefore not be compared directly with complete calendar years. Citation counts are also time-dependent and strongly affected by citation lag, which disadvantages the large 2025–2026 publication cohorts.

Fourth, country analysis depends on affiliation metadata and full counting, so each document contributes to every country represented among its affiliations. Nine records lacked confidently detectable country information. Fifth, 75 records did not provide author keywords, meaning that the conceptual map represents the subset with keyword metadata. Sixth, keyword harmonization is necessary to reduce lexical fragmentation but introduces analytical judgement. Seventh, cited-reference co-citation maps can be affected by citation-string variation, so closely related versions of the same source may appear as separate nodes; the co-citation findings are therefore interpreted primarily at the cluster and structural level. Finally, bibliometric and thematic mapping identify patterns of publication, influence, co-occurrence, and intellectual relatedness; they do not establish causality, evaluate the methodological quality of individual studies, or demonstrate that highly cited themes have the greatest social value.

ACKNOWLEDGMENT

N/A

DECLARATION OF CONFLICTING INTERESTS

N/A

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