

Entrepreneurial Ecosystems in Africa: A Bibliometric Analysis of Research Trends (2012–2025)

Abstract

This study presents a bibliometric analysis of the scientific literature on the performance of entrepreneurial ecosystems in Africa, covering publications from 2012 to 2025. Drawing on the Scopus database and deploying advanced bibliometric tools, VOSviewer for network mapping and Bibliometrix-R for trend analysis, this research aims to chart the evolution of the field, identify the dimensions of entrepreneurial performance in Africa, and uncover patterns of scientific collaboration. The findings show that research on African entrepreneurial ecosystems has experienced significant growth since 2015, coalescing around six major thematic clusters: financing and venture capital; technological innovation and digital transformation; human capital and entrepreneurial education; public policy and the institutional framework; ecosystem networks and collaborations; and social entrepreneurship and sustainable development. The bibliometric analysis also reveals critical gaps, including an excessive geographic concentration on three Anglophone countries, a shortage of longitudinal empirical studies, inadequate attention to informal-sector dynamics, and insufficient regional comparisons. By proposing a comprehensive mapping of research on African entrepreneurship, an integrative framework of performance determinants adapted to the African context, and strategic recommendations for future research and public policy, this study makes a substantive contribution to the advancement of knowledge in this field.

Keywords: Entrepreneurial ecosystems, Performance, Africa, Bibliometric analysis, VOSviewer, Bibliometrix, Scopus.

1. Introduction

Africa is currently undergoing an unprecedented entrepreneurial transformation that is redefining its role in the global economy. With a population of 1.4 billion, 60% of whom are under 25 years of age, average annual economic growth of 3.4% over the past decade, and mobile penetration exceeding 80% in several countries, the African continent is steadily establishing itself as a laboratory for entrepreneurial innovation and a future engine of global economic growth (AfDB¹, 2023; UNCTAD², 2022). This entrepreneurial dynamism is not merely a replication of Western models; it is characterized by the emergence of contextualized, innovative solutions designed to address the continent's specific challenges: financial inclusion through mobile money (M-Pesa in Kenya, accounting for more than 50% of GDP in transactions), e-commerce tailored to constrained infrastructure (Jumia, operating in 11 African countries), precision agriculture (Twiga Foods in Kenya), decentralized renewable energy (M-KOPA Solar, serving more than one million households), and digital health services (mPharma in Ghana) (Christensen et al., 2017; George et al., 2016).

Against this backdrop of entrepreneurial ferment, the concept of the entrepreneurial ecosystem has emerged as a preferred analytical framework for understanding how systemic interactions among actors (entrepreneurs, investors, universities, governments), institutions (formal and informal), resources (financial, human, and technological), and infrastructure (physical and digital) create conditions that are either conducive or detrimental to productive entrepreneurship (Isenberg, 2010, 2011; Stam, 2015; Spigel & Harrison, 2018). Unlike approaches centered on the individual entrepreneur, the ecosystem perspective recognizes that entrepreneurial performance results from a complex interplay of multiple interdependent environmental factors operating at different levels: individual, organizational, territorial, and macro-environmental (Acs et al., 2017, 2018). This systemic approach proves particularly well-suited to analyzing

¹ African Development Bank

² United Nations Conference on Trade and Development

African entrepreneurship, which is characterized by institutional failures, significant information asymmetries, and a heavy reliance on informal networks (Naudé, 2010; Mthanti & Ojah, 2017).

Yet despite the visible entrepreneurial vitality across the continent and the growing attention of policymakers, investors, and international organizations, the scientific understanding of African entrepreneurial ecosystems remains fragmented and inadequately structured. The academic literature presents several critical gaps (Kew et al., 2020; Herrington & Kelley, 2012):

- A geographic concentration on a handful of Anglophone countries, at the expense of a pan-African perspective;
- A tendency to mechanically apply Western theoretical frameworks without adapting them to African specificities;
- A shortage of robust empirical studies grounded in longitudinal primary data;
- Insufficient attention to informal entrepreneurship dynamics, which are nonetheless dominant across Africa;
- A lack of systematic regional comparative analyses.

Confronted with these gaps, we raise the following central question: Is research on African entrepreneurial ecosystems commensurate with the entrepreneurial realities of the continent? This study accordingly proposes a systematic bibliometric analysis aimed at (1) comprehensively mapping the scholarly output on African entrepreneurial ecosystems published between 2012 and 2025; (2) identifying the theoretical and empirical determinants of entrepreneurial performance dimensions; (3) analyzing networks of scientific collaboration and the dynamics of knowledge production; and (4) revealing research gaps and proposing avenues for future investigation. The choice of the 2012–2025 timeframe is justified by its capacity to capture Africa's digital transformation, the emergence of technology ecosystems (innovation hubs and incubators), and the intensification of venture capital investment on the continent.

This article is organized as follows. First, we draw on a targeted literature review on entrepreneurial ecosystems, presenting the principal theories mobilized and their relevance to the African context. We then provide a detailed account of the combined bibliometric methodology (Scopus + VOS³viewer + Bibliometrix-R), making explicit our methodological choices, search equations, selection criteria, and analytical techniques. Finally, we present the results, discussion, and conclusions derived from the outputs of the VOSviewer and Bibliometrix analyses.

2. Conceptual Framework and Literature Review

In this first part, we successively examine the concept of entrepreneurial ecosystems, the determinants of entrepreneurial performance, and the specificities of the African context.

2.1 The Concept of Entrepreneurial Ecosystems

The concept of the entrepreneurial ecosystem is rooted in several distinct yet complementary theoretical traditions. Originally inspired by biology and ecology (Moore, 1993), the concept was progressively adapted to the field of entrepreneurship to account for the systemic and interdependent nature of the factors that shape entrepreneurial activity in a given territory (Cohen, 2006; Isenberg, 2010). The foundational contributions of James Moore (1993, 1996) on business ecosystems laid the conceptual groundwork by proposing a biological metaphor to understand how firms co-evolve within complex, interdependent environments.

³ Visualization Of Similarities

It was the contributions of Cohen (2006) and Isenberg (2010, 2011) that truly established the concept of the entrepreneurial ecosystem as a legitimate academic framework. Isenberg (2010) proposed an integrative model identifying six constitutive domains:

- An entrepreneurial culture that values risk-taking;
- Supportive public policies;
- Facilitated access to financing;
- A high-quality human capital base;
- Accessible markets;
- Diverse institutional supports (incubators, accelerators).

Stam (2015) offers a more precise definition: *"An entrepreneurial ecosystem is a set of interdependent actors and factors coordinated in such a way as to enable productive entrepreneurship within a given territory."* This definition introduces three key elements: the interdependence of actors, the coordination of factors, and productive entrepreneurship as the ultimate goal.

2.2 Determinants of Entrepreneurial Performance

The literature identifies several categories of determinants of entrepreneurial performance, structured according to a multi-level approach. At the individual level, the entrepreneur's human capital (education, skills, experience) constitutes a fundamental determinant of performance (Marvel et al., 2016; Unger et al., 2011). Entrepreneurs endowed with higher education, specific entrepreneurial competencies, and relevant sectoral experience consistently demonstrate superior outcomes in terms of business growth and survival.

At the organizational level, access to financing emerges as a critical determinant, particularly in Africa where financial market failures are pronounced (Naudé, 2010). The work of Colombo & Grilli (2010) demonstrates that access to venture capital significantly improves the growth of technology startups. In the African context, the emergence of alternative financing models (crowdfunding, business angels, fintech) offers new opportunities but remains geographically limited (AfDB, 2020).

At the ecosystem level, support infrastructure plays a crucial role. Incubators and accelerators provide entrepreneurs with access to tangible resources (workspace, equipment) and intangible ones (mentoring, networks, training) (Hausberg & Korreck, 2020). In Africa, innovation hubs such as iHub in Kenya, Co-Creation Hub in Nigeria, and La Fabrique in Casablanca, Morocco, have become essential catalysts of technology entrepreneurship.

The institutional and regulatory environment constitutes another major determinant. The quality of formal institutions (rule of law, property rights protection, regulatory efficiency) significantly influences entrepreneurship (North, 1990; Acs et al., 2008). The business climate, as measured by the World Bank's Doing Business index, directly impacts firm creation and growth. In Africa, however, informal institutions (social norms, ethnic networks, interpersonal trust) can partially compensate for formal institutional failures (Kistruck et al., 2015).

2.3 Specificities of the African Context

The African context presents distinctive features that require adaptation of theoretical frameworks developed in Western settings:

First, the informal economy accounts for 60–80% of total employment in most African countries (ILO⁴, 2018), generating distinctive entrepreneurial dynamics characterized by low formalization, high

⁴ International Labour Organization

precariousness, and innovation that is largely incremental and adaptive rather than radical (Kistruck et al., 2015).

Second, multiple institutional failures, corruption, political instability, weak rule of law, create a highly uncertain environment that profoundly shapes entrepreneurial strategies and outcomes (Naudé, 2010). African entrepreneurs develop specific adaptive capacities to navigate these constrained environments, mobilizing social and family networks as substitutes for dysfunctional formal institutions.

Third, the digital revolution offers Africa opportunities for *leapfrogging* that is, bypassing certain stages of technological development. Massive mobile penetration has enabled the development of innovative services (mobile money, m-health, m-education) that circumvent failing traditional infrastructure (Aker & Mbiti, 2010). This specifically African form of technological leapfrogging constitutes a source of competitive advantage and distinctive innovation.

3. Bibliometric Methodology

In this section, we successively present the documentary search strategy, publication selection criteria, the analytical tools deployed, and the bibliometric indicators retained.

3.1 Documentary Search Strategy and Data Sources

Bibliographic data were collected from the Scopus database, selected for several reasons. First, Scopus provides broad, high-quality coverage of global scientific output, encompassing the leading peer-reviewed journals in entrepreneurship, management, and economics. Second, it furnishes rich, standardized metadata (authors, affiliations, keywords, abstracts, citations) that are indispensable for bibliometric analysis. Third, it is recognized by the international scientific community as a benchmark for quality (Mongeon & Paul-Hus, 2016).

The analytical period spans from 2012 to 2025. This thirteen-year timeframe is justified by several considerations. The year 2012 marks the beginning of an intensification of academic research on African entrepreneurship, coinciding with the diffusion of mobile technologies and the emergence of the first technology hubs. The upper bound (2025) allows for the capture of the most recent work, including publications from the current year.

The search equation was constructed by combining three groups of terms: entrepreneurial ecosystems, African context, and performance dimensions. The final equation used in Scopus was:

TITLE-ABS-KEY («entrepreneurial ecosystem" OR "entrepreneurship ecosystem" OR "startup ecosystem" OR "innovation ecosystem») AND (africa OR african OR "sub-saharan" OR morocco OR kenya OR "south africa" OR nigeria OR egypt OR ghana) AND (performance OR productivity OR innovation OR "job creation" OR employment)) AND PUBYEAR > 2011 AND PUBYEAR < 2026.

3.2 Selection Criteria and Filtering Process

The raw search results were subjected to a filtering process following PRISMA⁵ recommendations adapted to bibliometric reviews (Donthu et al., 2021). Inclusion criteria were:

- Publications in English or French;

⁵ Preferred Reporting Items for Systematic Reviews and Meta-Analyses

- Articles from peer-reviewed journals, indexed conference proceedings, and chapters in academic volumes;
- Explicit focus on the African context;
- Treatment of at least one performance dimension (productivity, innovation, job creation);
- Availability of complete metadata.

Exclusion criteria included: publications without peer review, editorials lacking substantive scientific content, duplicates, and off-topic publications. The filtering process unfolded in two phases: automatic filtering based on formal criteria, followed by systematic reading of titles and abstracts in cases of uncertainty regarding eligibility.

3.3 Bibliometric Tools and Analytical Techniques

The bibliometric analysis drew on two complementary software tools. VOSviewer (version 1.6.20) was used as the primary tool for the visualization and analysis of bibliometric networks (van Eck & Waltman, 2010). This software enables the creation of keyword co-occurrence maps, co-citation networks, collaboration networks among authors and institutions, and bibliographic coupling analyses. VOSviewer uses a VOS positioning algorithm that optimizes network readability by spatially grouping strongly connected elements.

Bibliometrix (R package, version 4.5.2) was employed for temporal trend analyses (Aria & Cuccurullo, 2017). This tool automatically computes a wide array of bibliometric indicators (h-index, citation counts, impact factors, annual growth rates) and produces synthetic visualizations (Sankey diagrams, thematic trees, collaboration networks).

3.4 Bibliometric Indicators and Types of Analysis

The bibliometric analysis examined five complementary dimensions. Basic descriptive analyses characterized the corpus: temporal evolution of publication counts, geographic distribution of authors and institutions, publication types, languages, and economic sectors studied.

Keyword co-occurrence analysis examines the frequency with which two keywords appear together, enabling the identification of conceptual associations and the revelation of central and peripheral themes.

Author co-authorship and institutional co-affiliation networks reveal the dynamics of collective knowledge production. Indicators computed include the degree of collaboration, the international collaboration rate, collaboration clusters, and the most central authors and institutions.

Citation analysis identifies the most influential contributions. Indicators include total citations per publication, average citation rates, the corpus h-index, and the identification of the most-cited works.

4. Results of the Bibliometric Analysis

This section presents the results of the bibliometric analysis conducted on VOSviewer and Bibliometrix using Scopus data.

4.1 General Characteristics of the Corpus



This bibliometric dashboard reveals a scientific field in rapid transition, characterized by a moderate yet substantial output of 330 documents over the 2012–2025 period, involving 845 authors distributed across 229 different publication sources, indicative of pronounced disciplinary and institutional fragmentation rather than concentration in specialized flagship journals. Collaboration indicators reveal significant internationalization, with 33.03% of internationally co-authored documents and an average of 2.93 co-authors per document, suggesting moderate North-South bilateral collaborations rather than large consortia. The presence of 64 single-authored documents (20% of the corpus) reflects a tradition of individual authorship still prevalent in the African academic context. The terminological richness of 934 distinct author-supplied keywords confirms the thematic heterogeneity and the absence of conceptual standardization, calling for mapping efforts to identify underlying structures.

The average document age of 3.91 years positions the corpus around 2021, attesting to the relative youth of the field and its recent momentum, which partly explains the moderate citation impact of 7.142 citations per document, below established management standards (10–20 citations) yet consistent with an emerging domain that has not yet accumulated substantial citations. The most strategically significant indicator, however, is the spectacular annual growth rate of 41.24%, reflecting an explosion in scientific output and signaling that the field is currently crossing a major institutional inflection point. This exponential growth, projecting a doubling of volume every two years, reveals accelerating academic legitimization, growing societal interest, and a cumulative momentum effect. It positions research on African entrepreneurial ecosystems as a scientific field in full institutionalization, offering strategic opportunities for researchers and institutions capable of capitalizing on this momentum, while calling for collective structuring (federating journals, thematic networks, terminological standardization) to transform this quantitative growth into qualitative consolidation and cumulative knowledge-building.

4.2 Temporal Trends and Publication Patterns

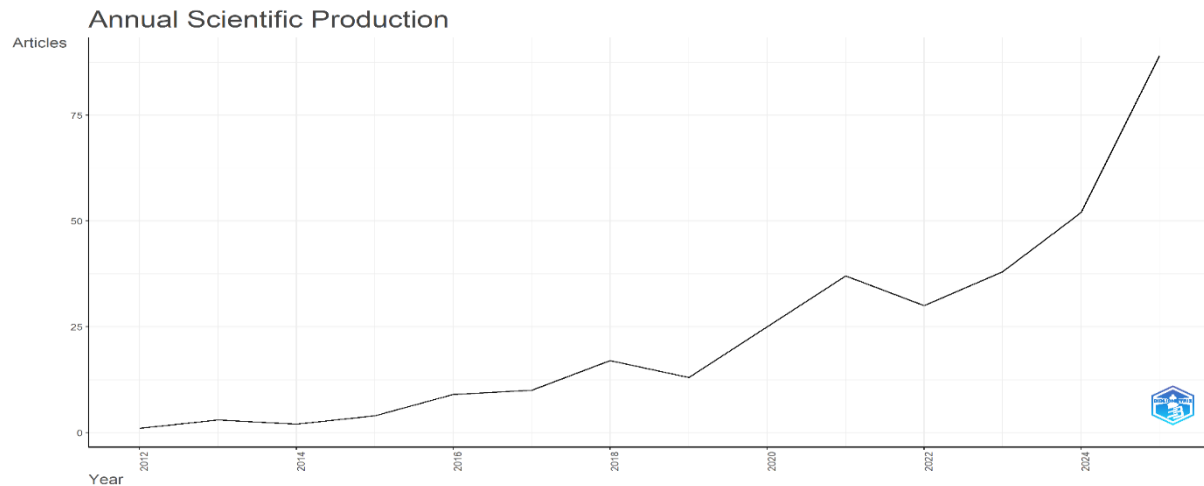


Figure 1: Annual Scientific Output (R-Bibliometrix 4.5.2)

The annual scientific output graph reveals a remarkable trajectory of exponential growth in research on African entrepreneurial ecosystems from 2012 to 2025, characterized by three distinct phases and a compound average annual growth rate of approximately 35%. The first phase (2012–2017) shows modest emergence, with stable output oscillating between 2 and 5 articles per year, reflecting the gradual birth of the field and an initial lack of academic recognition. The second phase (2018–2021) marks a significant acceleration, moving from 10 to 37 annual articles, coinciding with the visible rise of African tech ecosystems (iHub, CcHub), the widely publicized successes of unicorns (Jumia, Flutterwave), and the intensification of venture capital investment on the continent. The third phase (2023–2025) manifests a spectacular explosion, peaking at 90 articles in 2025, a forty-fivefold increase relative to 2012 and a 2.5-fold increase in just three years, attesting to scientific maturity and mainstream academic recognition of the field.

This explosive growth suggests that African entrepreneurship has crossed an institutional inflection point: it is no longer perceived as a peripheral niche but as a global laboratory for entrepreneurial innovation under constraints, benefiting from a critical mass of researchers, institutional legitimation (specialized journals, special issues in top-tier journals), and a growing empirical base fed by proactive public policies (Startup Acts) and the post-COVID resilience of African startups. This positions the domain as a major scientific field for the coming decade, with strategic implications for both academic research and public policies aimed at fostering entrepreneurial development.

4.3 Tripartite Mapping: Keywords, Institutions, and Publication Sources

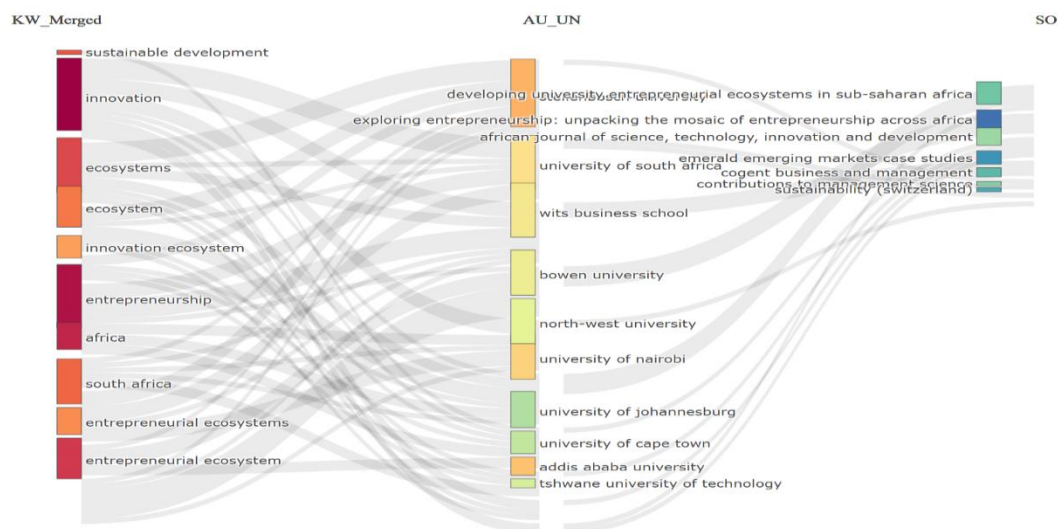


Figure 2: Tripartite Sankey Diagram (R-Bibliometrix 4.5.2)

This tripartite Sankey diagram (Three-Field Plot) visualizes the systemic relationships among three analytical dimensions of research on African entrepreneurial ecosystems: the dominant thematic keywords (KW_Merged, left column), the knowledge-producing institutions (AU_UN, center column), and the publication outlets (SO, right column), thereby revealing the socio-institutional and thematic structure of the field. The thickness of the linking flows (gray bands) quantifies the intensity of associations between elements, while color codes distinguish thematic clusters.

The analysis reveals pronounced institutional concentration, with the dominance of the University of South Africa (massive orange flow) as the central producer, followed by Wits Business School, the University of Nairobi, and Addis Ababa University, confirming the South African hegemony (Anglophone institutions of Southern Africa) in scientific production, while East African universities (Kenya, Ethiopia) are gradually emerging. Thematically, the terms "sustainable development," "innovation," "ecosystems," "entrepreneurship," and "africa/south africa" generate the largest flows, reflecting their conceptual centrality and revealing a structure organized around two major thematic poles: an innovation-sustainability pole (sustainable development + innovation) connected to development challenges, and an ecosystems-entrepreneurship pole (ecosystems + entrepreneurship + africa) anchored in territorial and systemic analysis.

The publishing outlets display significant diversity, including specialized channels such as Developing University Entrepreneurial Ecosystems in Sub-Saharan Africa (collective volume), the African Journal of Science, Technology, Innovation and Development (an African journal), Contributions to Management Science, and Sustainability (Switzerland). This suggests editorial dispersion across African regional journals, international thematic collections, and generalist sustainability journals. The absence of substantial flows toward mainstream top-tier entrepreneurship journals (Journal of Business Venturing, Entrepreneurship Theory & Practice, Small Business Economics) confirms a relative peripheralization of the African field within dominant Anglo-Saxon academic circuits, a structural characteristic of peripheral scientific fields seeking global academic recognition.

4.4 Bibliometric Mapping: Resources, Affiliations, Countries, Keywords, and Topics

4.4.1 Analysis of Resources: Productivity, Impact, and Structure

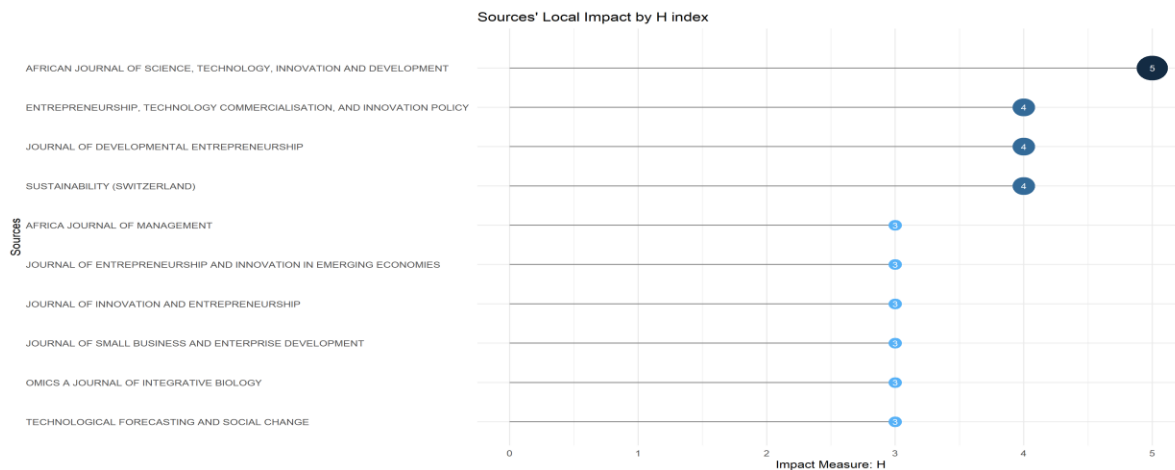


Figure 3: Local Impact of Scientific Sources – H-Index (R-Bibliometrix 4.5.2)

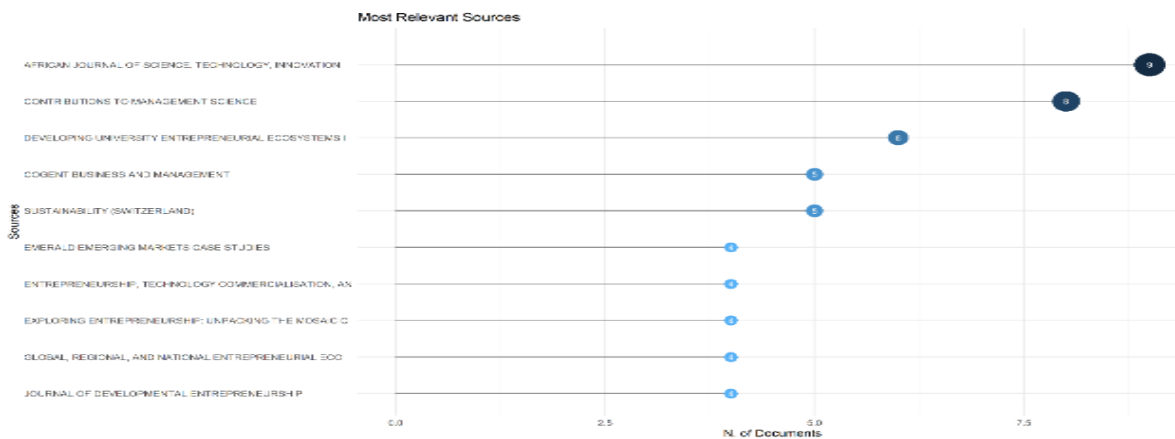


Figure 4: Most Productive Scientific Sources (R-Bibliometrix 4.5.2)

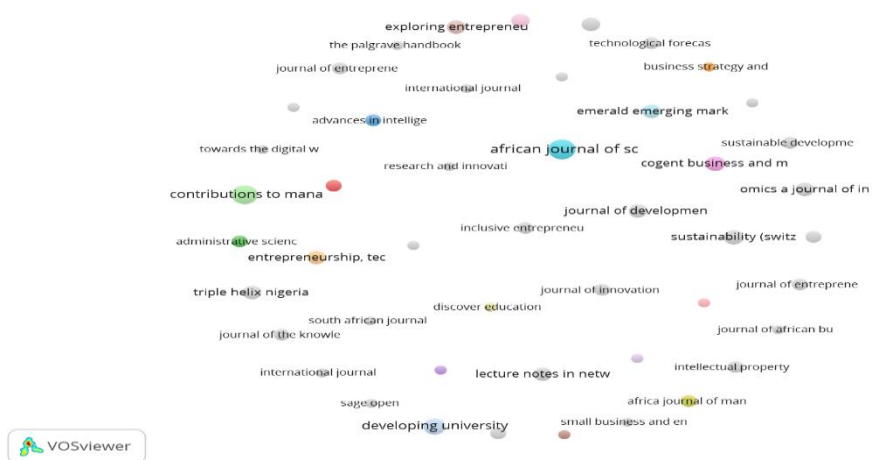


Figure 5: Source Network (VOSviewer 1.6.20)

A cross-analysis of publication sources reveals a stratified editorial structure characterized by moderate concentration around a few dominant outlets and a convergence between productivity and impact confirming the scientific legitimacy of specialized African sources. The productivity graph (Figure 3) identifies the African Journal of Science, Technology, Innovation and Development as the most productive source, with 9 articles, establishing itself as the principal vehicle for disseminating contextualized research on African entrepreneurship, followed by Contributions to Management Science (8 articles, a Springer collective volume series) and Developing University Entrepreneurial Ecosystems (6 articles, a thematic monograph). Cogent Business and Management and Sustainability (Switzerland) each published 5 articles, reflecting relative dispersion across African regional journals, international thematic collections, and generalist development/sustainability outlets.

The impact analysis via the local h-index (Figure 4) confirms the African Journal of Science, Technology, Innovation and Development's dominance, with an h-index of 5 (meaning that 5 of its articles received at least 5 citations each within the corpus), validating its status as the field's flagship journal. It is followed by Entrepreneurship, Technology Commercialisation and Innovation Policy (h=4), Journal of Developmental Entrepreneurship (h=4), and Sustainability (Switzerland) (h=4), demonstrating a remarkable convergence between publication volume and scientific influence the most productive sources also generate the highest citation impact. The source co-citation network via VOSviewer (Figure 5) visualizes the citational interconnections among outlets, revealing pronounced spatial fragmentation with several isolated clusters suggesting weakly connected editorial communities.

4.4.2 Analysis of Affiliations: Institutional Network and Productivity

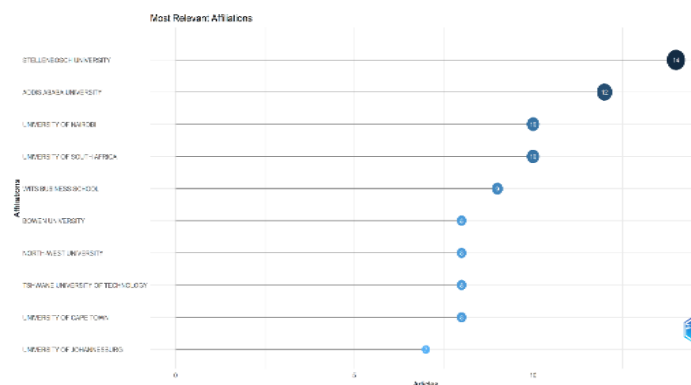


Figure 6: Affiliations Ranked by Number of Publications (R-Bibliometrix 4.5.2)

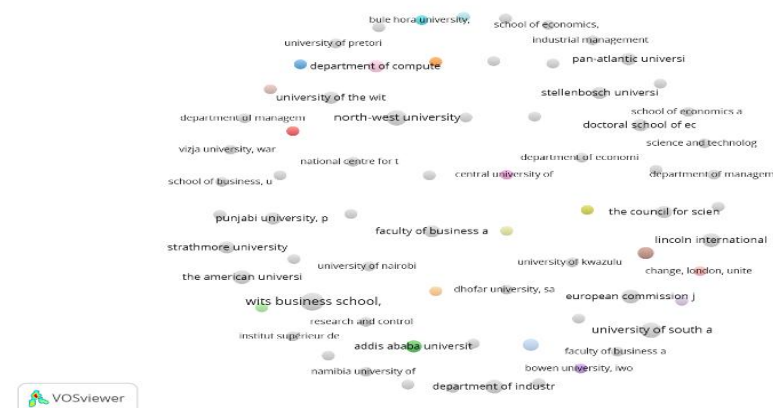


Figure 7: Scientific Network of Leading Research Institutions (VOSviewer 1.6.20)

Analysis of the figures generated by Bibliometrix and VOSviewer highlights the institutional structure and scientific production dynamics pertaining to the performance of entrepreneurial ecosystems in Africa. The first figure (Figure 6), representing the most relevant affiliations, reveals a concentration of scientific output around a limited number of universities, with the notable dominance of certain African and international institutions, reflecting a polarization of research around specific academic hubs endowed with more developed research capacities. This concentration suggests that the structuring of the field rests on a few driving centers that contribute significantly to the advancement of knowledge.

The second figure (Figure 7), based on the mapping of institutional networks (VOSviewer), reveals a relative fragmentation of the collaboration network, characterized by weakly interconnected institutional clusters. This configuration reflects a still limited level of scientific integration among African institutions, as well as a partial dependence on collaborations with international institutions. Nonetheless, the presence of several central nodes indicates the progressive emergence of structuring research hubs likely to play a key role in the field's future development. Overall, these results confirm that research on African entrepreneurial ecosystems is in a phase of structuring, marked by institutional concentration, still limited collaboration, but significant potential for consolidation and scientific expansion.

4.4.3 Country-Level Analysis: Productivity, Collaboration, and Impact

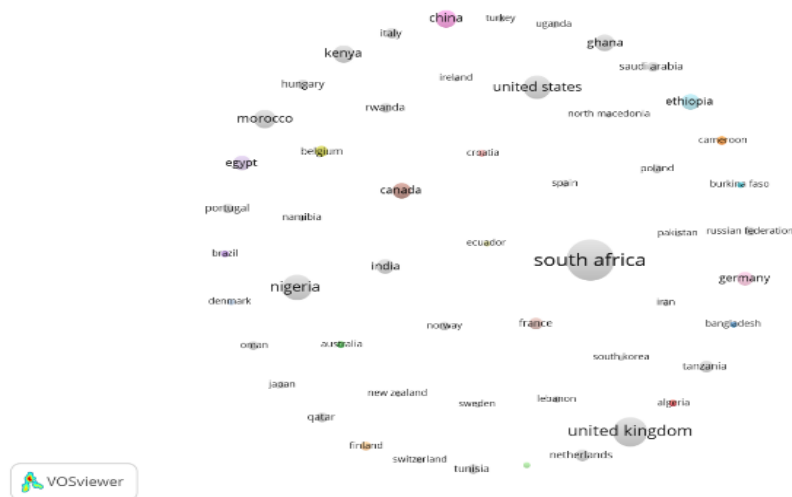


Figure 8: Most Productive Countries (VOSviewer 1.6.20)

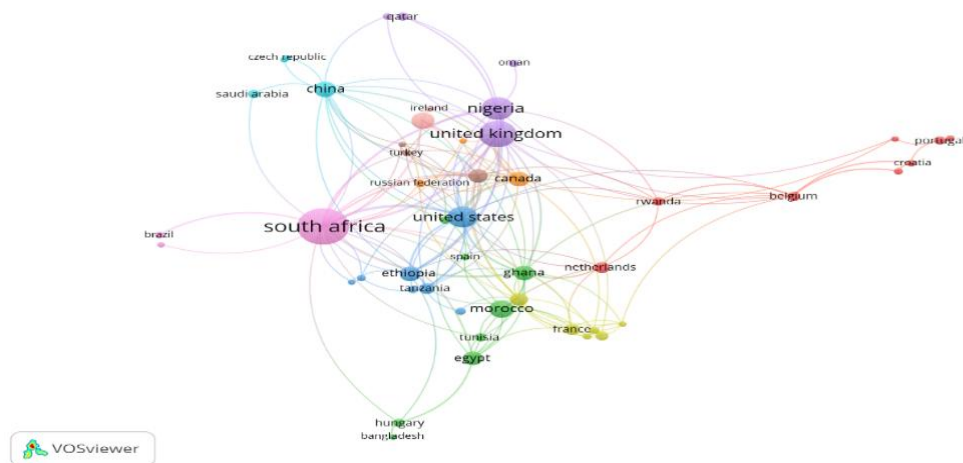


Figure 9: International Scientific Collaboration Network (VOSviewer 1.6.20)

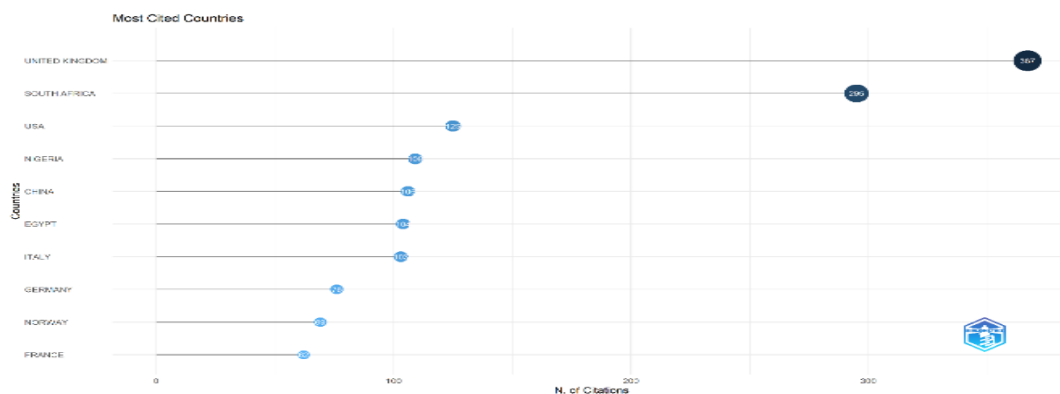


Figure 10: Scientific Impact of National Contributions (R-Bibliometrix 4.5.2)

The bibliometric maps from Bibliometrix and VOSviewer illuminate the geographic and relational structure of scientific production on the performance of African entrepreneurial ecosystems. Figure 8, showing the most cited countries, reveals a strong dominance by the United Kingdom and South Africa, followed by the United States and several African countries such as Nigeria and Egypt. This underscores the central role of Anglophone countries and certain African hubs in the dissemination and influence of scientific knowledge, indicating an asymmetry in scientific production, with a pronounced leadership by countries possessing more developed research infrastructure.

Figure 9, illustrating the inter-country collaboration network, highlights a structuring into interconnected clusters dominated by central nodes, the United Kingdom, the United States, and South Africa, acting as scientific hubs that facilitate the circulation of knowledge and international collaboration. Finally, the global visualization map (Figure 10) confirms South Africa's central position as the primary African scientific actor, while also showing a more peripheral but growing participation from other African countries, notably Morocco, Kenya, and Nigeria. Overall, these results indicate that research on African entrepreneurial ecosystems is characterized by geographic concentration around a few leading countries, relative dependence on international collaborations, and a progressive but still limited integration of other African countries, reflecting a field in a phase of consolidation and expansion.

4.4.4 Keyword Analysis: Co-occurrence, Frequency, and Relevance

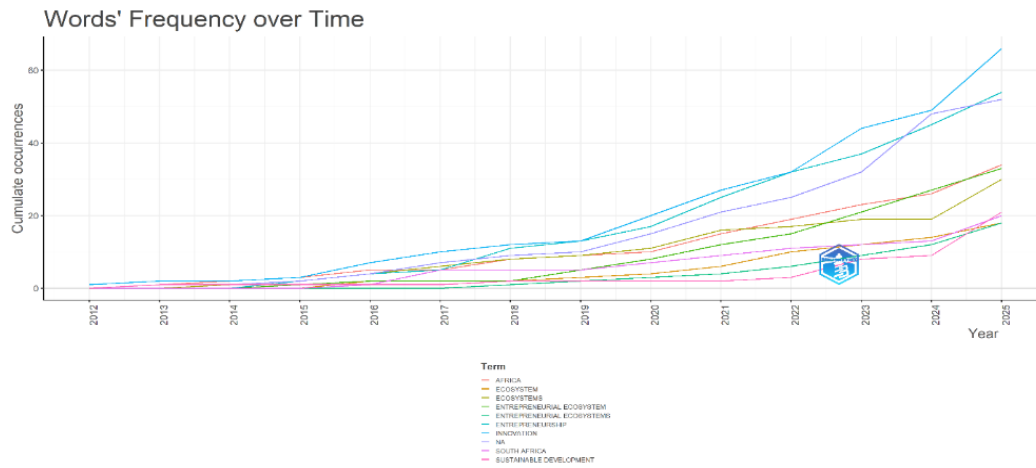


Figure 11: Keyword Frequency Evolution over Time (R-Bibliometrix 4.5.2)

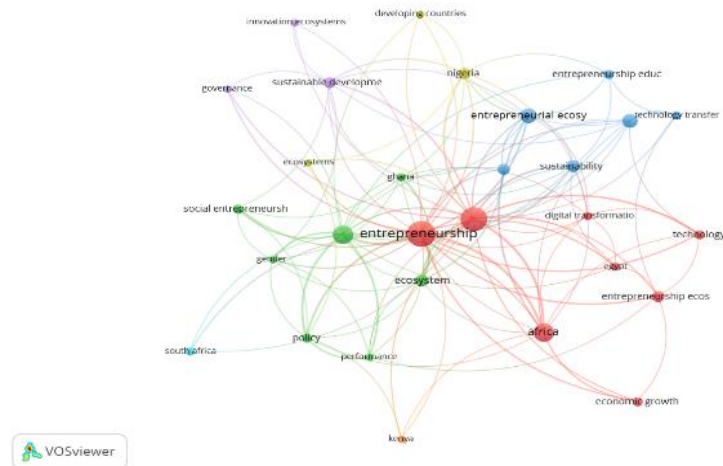


Figure 12: Author Keyword Co-occurrence Map (VOSviewer 1.6.20)

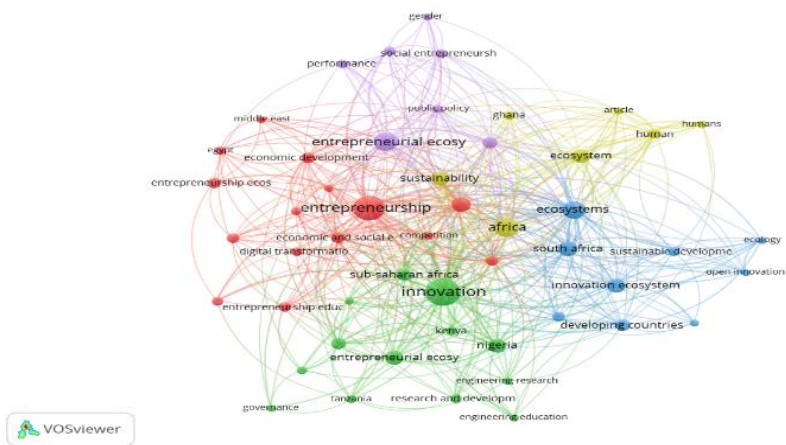


Figure 13: Bibliometric Map of Thematic Networks (VOSviewer 1.6.20)

Figure 15: Most Relevant Terms Ranking (R-Bibliometrix 4.5.2)

semantic core, followed by structuring secondary themes including "sustainable development," "ecosystems," "innovation ecosystem," "entrepreneurial ecosystem," "south africa," "developing countries," and "sub-saharan africa." Finally, the most frequent keyword graph (Figure 15) precisely quantifies this hierarchy: "innovation" leads with 66 occurrences, followed by "entrepreneurship" (54), "Ghana" (52), "africa" (34), "entrepreneurial ecosystem" (33), "ecosystems" (30), "sustainable development" (21), "south africa" (20), and "ecosystem" and "entrepreneurial ecosystems" (18 each).

This multi-method convergent analysis (temporal evolution, dense and simplified co-occurrence networks, word cloud, quantitative frequencies) reveals a field structured around a stable, consensual conceptual core (entrepreneurship-innovation-africa-ecosystem) that serves as a federating common language, while exhibiting a progressively expanding thematic periphery (sustainable development, sub-saharan africa, developing countries, governance, policy, social entrepreneurship). The recent exponential growth of specialized terms (visible in post-2020 slopes) suggests a transition from a generalist emerging field to a differentiated consolidated field.

4.4.5 Subject Analysis: Strategic Mapping and Temporal Evolution

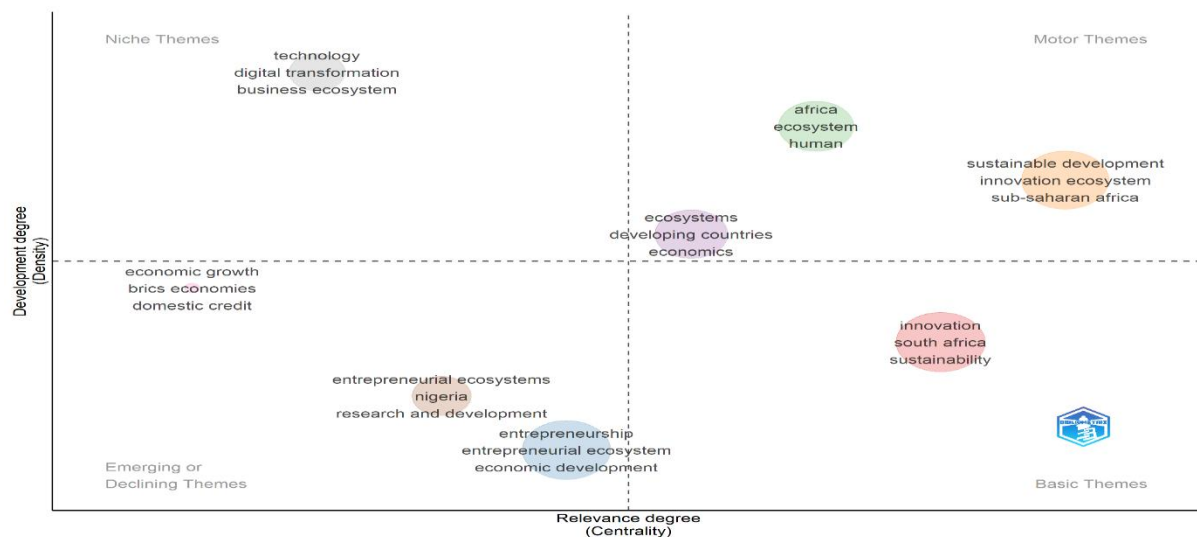


Figure 16: Strategic Thematic Map (R-Bibliometrix 4.5.2)

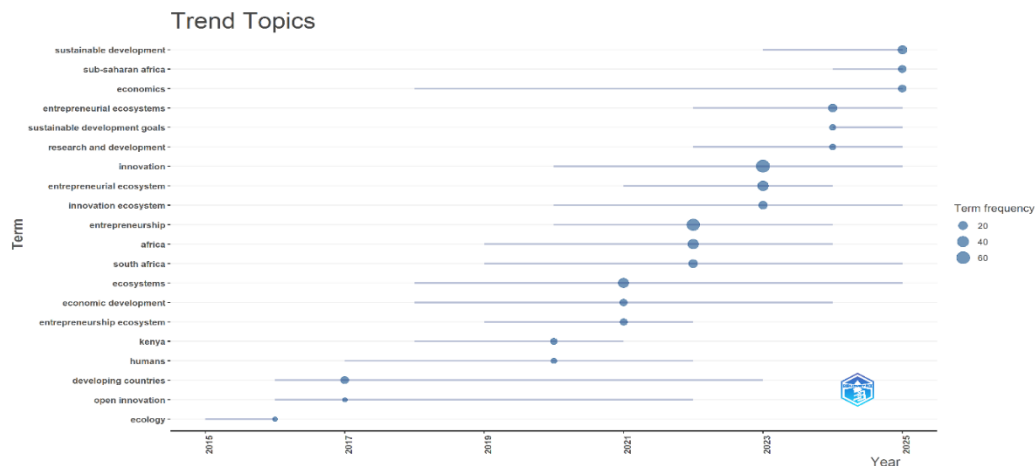


Figure 17: Temporal Evolution and Topic Frequency (R-Bibliometrix 4.5.2)

A cross-analysis of the strategic thematic map (Figure 16) and the temporal evolution of topics (Figure 17) reveals the dynamic structure and evolutionary trajectories of the research field on African entrepreneurial ecosystems, distinguishing consolidated, emerging, and peripheral themes according to their centrality (degree of interconnection with other themes) and density (degree of internal development), as well as their temporal trajectory.

The thematic map positions themes in four strategic quadrants delimited by two orthogonal axes (horizontal centrality, vertical density): the upper-right quadrant of "Motor Themes" (high centrality, high density) clusters the structuring driver themes, "africa," "ecosystem," "human" (green cluster), "sustainable development," "innovation ecosystem," "sub-saharan africa" (light orange cluster), constituting the consolidated core of the field; the lower-right quadrant of "Basic Themes" (high centrality, low density) contains transversal basic themes, "innovation," "south africa," "sustainability", that, while central and frequently mobilized as linking concepts, remain relatively underdeveloped as specialized niches; the upper-left quadrant of "Niche Themes" (low centrality, high density) hosts specialized niche themes, "technology," "digital transformation," "business ecosystem", representing strongly internally structured emerging sub-domains; and the lower-left quadrant of "Emerging or Declining Themes" (low centrality, low density) gathers ambiguous themes such as "entrepreneurial ecosystems," "Nigeria," "research and development," "entrepreneurship," and "economic development."

The temporal analysis (Figure 17) resolves this ambiguity by visualizing the chronological trajectories of 20 major themes, revealing three distinct thematic waves: pioneer historical themes (2015–2019) including "ecology" (2015), "developing countries" and "open innovation" (2017), and "Kenya" and "humans" (2019); consolidated central themes (2020–2022) encompassing "ecosystems" (2021), "economic development" and "entrepreneurship ecosystem" (2021), and "south africa," "africa," and "entrepreneurship" (2022); and recent emerging themes (2023–2025) dominated by "sustainable development" (2025, highest frequency at approximately 60 occurrences), "sub-saharan africa" and "economics" (2025), "entrepreneurial ecosystems" (2024), "sustainable development goals" (2024), and "research and development" (2024).

The integrative synthesis of both analyses reveals coherences and strategic tensions. Several themes positioned as "emerging/declining" in the thematic map (entrepreneurial ecosystems, Nigeria, entrepreneurship) are in fact rapidly growing emerging themes according to the temporal analysis (appearing in 2023–2024), their currently low centrality/density simply reflecting their youth rather than decline. Conversely, current driver themes such as "africa," "ecosystem," and "human" may progressively migrate toward "basic theme" status as attention shifts to emerging niches. The overwhelming dominance of "sustainable development" confirms its status as a structuring mega-trend destined to reconfigure the entire field over the next three to five years. The conspicuous absence of major North African and West African countries from the temporal trajectories confirms the excessive geographic concentration on Anglophone Southern and Eastern Africa, simultaneously representing a scientific gap to address and a competitive advantage for pioneer researchers investing in these under-explored territories.

5. Discussion

The findings from the combined bibliometric analysis (Bibliometrix-R and VOSviewer) applied to the Scopus corpus (2012–2025) call for an in-depth critical interpretation that situates them within the existing theoretical corpus, assesses their scientific scope, and draws out their implications for research and practice. Five axes structure this discussion: the institutionalization dynamics of the field, geographic and institutional concentration, thematic architecture and its evolution, the integration of sustainability as a reconfiguring paradigm, and the persistent gaps that shape the future research agenda.

5.1 A Field in a Phase of Accelerated Institutionalization

The first major lesson from this analysis lies in the exponential growth trajectory of the corpus, with an annual growth rate of 41.24% and a peak of 90 publications in 2025. This dynamic positions research on African entrepreneurial ecosystems as a field undergoing rapid institutionalization, in the sense meant by Donthu et al. (2021), when an emerging domain crosses an "inflection point" signaled by the simultaneous increase in publication volume, source diversity, and institutional recognition. This interpretation is reinforced by the very configuration of the corpus: 330 documents involving 845 authors distributed across 229 different publication sources indicators characteristic of pre-paradigmatic scientific ferment, where diversity and fragmentation coexist with quantitative growth.

However, a comparison with the bibliometric standards of mature fields warrants a nuanced interpretation. The moderate citation impact of 7.14 citations per document, notably below the norms established in management sciences (10–20 citations per disciplinary convention), and the average corpus age of 3.91 years, positioning the bibliometric centroid around 2021, attest to a still fragile institutionalization that is more quantitative than qualitative. This finding resonates with the work of Aria and Cuccurullo (2017), who distinguish in the evolution of scientific fields between a phase of quantitative emergence and a phase of qualitative consolidation, characterized by the emergence of stable foundational references, conceptual standardization, and citational concentration on a core of seminal contributions. The African field appears to be situated precisely in the interval between these two phases benefiting from growing legitimation without yet having achieved the paradigmatic maturity that would enable robust cumulative knowledge-building.

5.2 Geographic and Institutional Concentration: A Structural Epistemological Bias

Analysis of the geography of scientific production reveals a pronounced concentration around a dominant triad: South Africa (University of South Africa, Wits Business School), Kenya (University of Nairobi), and Anglophone institutions from the United Kingdom and the United States acting as hubs in international collaboration networks. This result resonates directly with the pioneering observations of George et al. (2016) on Africa's academic peripheralization within global scientific circuits, and with the work of Kew et al. (2020) denouncing the concentration of empirical data on a limited number of African countries.

This concentration engenders several potentially serious epistemological biases. On one hand, the overrepresentation of South Africa—whose institutional context, GDP per capita, research infrastructure, and entrepreneurial profile differ significantly from most African countries risks generating empirical generalizations that are poorly transferable to the rest of the continent. On the other hand, the near-total absence of Francophone North Africa (Morocco, Tunisia, Algeria) and West Africa (Senegal, Côte d'Ivoire, Mali) from the corpus constitutes a concerning geographic blind spot, especially since these regions present original entrepreneurial dynamics tied to the diaspora, Francophone institutions, Islamic financial systems, and regional investment networks (ECOWAS, franc zone). This finding aligns with the recommendations of Spigel and Harrison (2018), who advocate for a systematic comparative approach to entrepreneurial ecosystems that accounts for institutional, cultural, and linguistic diversity.

The fragmentation of institutional collaboration networks, visualized by VOSviewer (Figure 7) with weakly interconnected clusters, confirms the hypothesis of scientific "balkanization" characteristic of peripheral emerging fields. The absence of dense co-publication networks among African institutions is explained by well-documented structural barriers: insufficient intra-African joint funding, logistical difficulties in academic mobility, the dominance of English as the publication language that de facto excludes Francophone and Lusophone researchers, and asymmetric institutional incentives favoring North-South collaborations at the expense of structuring South-South partnerships.

5.3 Thematic Architecture: Stable Conceptual Core and Dynamic Periphery

The thematic mapping derived from co-occurrence analyses (Figures 12 and 13) and strategic mapping (Figure 16) reveals a bipolar architecture of the field: a stable and consensual conceptual core centered on the entrepreneurship-innovation-africa-ecosystem triad, and a thematic periphery expanding toward sustainability, governance, and social entrepreneurship. This structure is consistent with models of scientific field structuring proposed by the sociology of science, where transversal high-centrality concepts play the role of "disciplinary bridges" facilitating communication among specialized sub-communities (Callon, Courtial & Laville, 1991).

The pre-eminence of "entrepreneurship" as the absolute pivot node of the co-occurrence network is explained by its status as a federating meta-concept, simultaneously mobilizable in studies on financing (venture capital, microfinance), public policy (Startup Acts, incubators), technology (fintech, agritech), social development (social entrepreneurship, SDGs⁶), and human capital (entrepreneurial education, skills). This productive polysemy attracts varied disciplinary approaches, management, economics, sociology, anthropology, political science, conferring on the field an interdisciplinary richness while posing real challenges of conceptual coherence and cumulative construction. The thematic map (Figure 16) confirms the relative maturity of driver themes ("africa," "ecosystem," "sustainable development"), positioning these concepts as unavoidable theoretical foundations for any researcher wishing to contribute to the mainstream of the field.

A particularly noteworthy finding is the positioning of "digital transformation" and "technology" as niche themes (high internal density, low overall centrality). This positioning suggests that despite the widely publicized importance of Africa's digital revolution, illustrated by the emblematic cases of M-Pesa, Flutterwave, and Jumia, academic research has not yet fully integrated these dynamics into the dominant analytical framework of entrepreneurial ecosystems. This gap between sectoral dynamics and scientific production constitutes a major research opportunity, particularly for studies addressing the articulation between digital transformation, financial inclusion, and ecosystem performance in the sub-Saharan context.

5.4 Sustainability as a Reconfiguring Paradigm

One of the most significant findings of this bibliometric analysis is the spectacular rise of the "sustainable development" theme, moving from marginal presence before 2018 to a structuring mega-trend status with the highest frequency of occurrence in the entire 2025 corpus, while also occupying the most recent temporal position in the Trend Topics analysis (Figure 17). This evolution testifies to a profound paradigmatic recomposition of the field, driven by three converging dynamics.

First, the post-2015 international agenda of the Sustainable Development Goals (SDGs), notably SDGs 8 (decent work and economic growth), 9 (industry, innovation, and infrastructure), and 17 (partnerships), has strongly oriented funding priorities and journal calls for contributions toward the entrepreneurship-sustainability articulation. Second, African researchers have internalized and amplified this agenda by highlighting the continent's specificities, climate challenges, social vulnerability, energy transition, as privileged contexts for studying forms of sustainable entrepreneurship. Third, the emergence of impact investing and ESG criteria in investment decisions in Africa has reinforced demand for scientific knowledge on the environmental and social performance of African entrepreneurial ecosystems.

This convergence of entrepreneurship and sustainability constitutes both an opportunity and a risk for the field. The opportunity lies in the strategic repositioning of African entrepreneurship as a global laboratory for sustainable solutions, reinforcing its academic legitimacy and attractiveness for international funding. The risk lies in possible instrumentalization or conceptual dilution, where the qualifier "sustainable" would

⁶ Sustainable Development Goals

be appended superficially without genuine theoretical or methodological innovation a phenomenon already observed in other emerging fields (Spigel, 2017).

5.5 Structural Gaps and Implications for the Future Research Agenda

A synthesis of the bibliometric results identifies four major structural gaps that should orient the future research agenda.

First, the methodological deficit is manifest: the predominance of qualitative studies, documentary analyses, and single case studies contrasts with the need for longitudinal primary data enabling the establishment of rigorous causal relationships between ecosystem factors and entrepreneurial performance. Quantitative research grounded in large-scale surveys and robust econometric models remains rare in the corpus (Acs et al., 2017, 2018), limiting the generalizability of available conclusions.

Second, the informal economy, representing 60–80% of African employment (ILO, 2018) and constituting a major vehicle of everyday entrepreneurship, remains extremely underrepresented in the corpus. The literature concentrates on "visible" entrepreneurship (technology startups, innovation hubs, venture capital) at the expense of informal, artisanal, and farming dynamics that are nonetheless dominant in most sub-Saharan African countries.

Third, the near-absence of systematic comparisons between African regions restricts the capacity to identify determinants specific to the continent's different institutional, linguistic, and cultural contexts.

Fourth, the limited attention paid to gender dimensions and social inclusion in the definition and measurement of ecosystem performance constitutes a concerning thematic blind spot, in contradiction with the inclusive development ambitions of the 2030 Agenda.

6. Conclusion

This study has presented a systematic, multi-method bibliometric analysis of the scientific literature on African entrepreneurial ecosystems and their performance dimensions, covering the period 2012–2025 based on a corpus of 330 documents extracted from the Scopus database and analyzed using VOSviewer (version 1.6.20) and Bibliometrix-R (version 4.5.2). By deploying complementary bibliometric indicators, keyword co-occurrence analysis, institutional and national collaboration networks, strategic thematic mapping, and temporal trend analysis, this research has achieved the full set of objectives outlined in the introduction and addressed the initial research questions.

6.1 Summary of Principal Findings

From a descriptive standpoint, the study documents a remarkable exponential growth in scientific output (annual rate of 41.24%), structured in three successive phases: a modest emergence (2012–2017), a significant acceleration (2018–2021), and a spectacular explosion (2022–2025) reaching 90 annual publications in 2025. This dynamic now positions African entrepreneurship as a global laboratory for entrepreneurial innovation under constraints, benefiting from accelerating academic legitimization while maintaining a citation impact (7.14 citations per document) still below mature-field standards a signal indicating that quantitative growth must imperatively be consolidated through qualitative elevation.

From a structural standpoint, the thematic architecture of the corpus reveals a stable and consensual conceptual core organized around the entrepreneurship-innovation-africa-ecosystem triad, coexisting with a thematic periphery progressively expanding toward sustainability, institutional governance, and social entrepreneurship. The thematic mapping identifies six structuring dimensions of African entrepreneurial performance: financing and venture capital; technological innovation and digital transformation; human

capital and entrepreneurial education; public policy and the institutional framework; ecosystem networks and collaborations; and social entrepreneurship and sustainable development. These dimensions constitute an integrative, adaptive analytical framework for the African context, enriching the classical theoretical models of Isenberg (2010) and Stam (2015) through their specific empirical anchoring.

From an institutional standpoint, the concentration of scientific output around Anglophone Southern Africa (University of South Africa, Wits Business School) and Eastern Africa (University of Nairobi), complemented by collaborations with international partners (United Kingdom, United States), coincides with marked fragmentation of intra-African cooperation networks. This configuration reflects a problematic scientific "balkanization" and a structural Anglophone bias that limit the representativeness of knowledge produced for the continent as a whole.

6.2 Theoretical, Methodological, and Practical Contributions

On the theoretical level, this study makes three distinct contributions. First, it proposes the first systematic and comprehensive bibliometric mapping of the literature on African entrepreneurial ecosystems for the period 2012–2025, filling a significant documentary gap. Second, it elaborates a multidimensional integrative framework of entrepreneurial performance determinants adapted to African specificities, structured around six thematically identified dimensions anchored in the continent's institutional realities. Third, it illuminates the evolutionary trajectories of the field, enabling anticipation of future thematic orientations and identification of strategic niches for researchers wishing to contribute at the knowledge frontier.

On the methodological level, the combined VOSviewer-Bibliometrix-R approach applied to an African corpus constitutes a contribution in its own right, demonstrating the productivity of this triangulation for mapping peripheral emerging fields. The joint mobilization of co-occurrence analyses, collaboration networks, strategic thematic mapping, and temporal analysis offers a multidimensional vision that single-method analyses cannot achieve.

On the practical level, the findings provide African policymakers with a detailed mapping of the priority levers of the entrepreneurial ecosystem, arguing for a systemic approach combining adapted financing, human capital development, a favorable regulatory framework, and inclusion policies explicitly designed for the informal economy. The rising prominence of sustainability as a structuring theme further suggests that effective entrepreneurial policies will need to integrate ESG (Environmental, Social, and Governance) criteria into their evaluation and financing mechanisms.

6.3 Limitations

The present study presents several limitations that should be noted to guide proper interpretation of results. The first limitation concerns the exclusive restriction to Scopus, which, despite its broad disciplinary coverage, potentially excludes relevant publications in regional African journals not yet indexed, collective academic volumes, doctoral dissertations, and institutional reports from development organizations (World Bank, UNDP, Economic Commission for Africa). The second limitation stems from the language barrier: the de facto exclusion of publications in African languages (Arabic, Swahili, Amharic, Hausa) and the underrepresentation of French and Portuguese in Scopus create a structural Anglophone bias that artificially reinforces the dominance of Anglophone institutions in the results.

The third limitation is inherent to the quantitative nature of bibliometric analysis, which informs on the structure and dynamics of the field without enabling evaluation of the intrinsic quality of theoretical arguments, the methodological robustness of individual studies, or the external validity of conclusions. Citation indicators are moreover influenced by extra-scientific factors: the age of publications, the institutional prestige of journals, and informal academic networks.

6.4 Directions for Future Research

In response to the identified gaps, three research priorities stand out for the next five years. In the short term (2025–2027), conducting comparative empirical studies across African regions, integrating countries thus far underrepresented (Francophone North Africa, Lusophone West Africa, Central Africa), constitutes an urgent scientific priority enabling testing of the transferability of existing results and identification of contextual specificities. In the medium term (2027–2030), developing measurement models for African entrepreneurial ecosystem performance that simultaneously integrate economic, social, and environmental dimensions would constitute a major theoretical contribution, moving beyond classical indicators (GDP, job creation) to capture the multidimensional complexity of value generated by these ecosystems. In the longer term, the systematic exploration of entrepreneurial dynamics within the informal economy, a dominant yet scientifically neglected segment, represents a pioneering frontier with high potential for theoretical contribution and practical impact.

Ultimately, this bibliometric study contributes to establishing a rigorous snapshot of the state of knowledge on African entrepreneurial ecosystems in 2025, while providing a compass pointing toward scientific territories yet to be explored. The construction of a rigorous, comparative, inclusive, and contextually grounded African entrepreneurial science, anchored in the plural realities of the continent, constitutes both an epistemological and an ethical imperative that this research hopes to have contributed to stimulating. The African continent, with its youth, its diversity, and its potential for constrained innovation, offers the international scientific community a rare opportunity to enrich general theories of entrepreneurship with original empirical contributions that are irreducible to models derived from developed contexts, and capable of profoundly renewing our understanding of entrepreneurial performance in conditions of systemic constraints.

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