Mapping the research landscape of small and medium enterprises in the green economy: A decade of systematic analysis (2014-2024)

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ABSTRACT

The transition toward a green economy represents a fundamental restructuring of production and consumption systems, with small and medium enterprises (SMEs) positioned as critical agents in this transformation. Despite growing scholarly attention to this nexus, comprehensive bibliometric analyses mapping the intellectual landscape remain limited. Drawing on bibliographic data from the Scopus and Google Scholar databases, this study presents a systematic bibliometric analysis of 851 documents on SMEs and the green economy published between 2014 and 2024, employing VOSviewer for network visualization and biblioshiny for thematic evolution mapping. The analysis reveals exponential growth in publications from 13 documents in 2014 to 223 in 2024, representing a compound annual growth rate of 33%. Geographic analysis identifies China (411 documents), the United Kingdom (251), and Italy (184) as leading contributors. Keyword co-occurrence analysis identifies five dominant thematic clusters: (1) green innovation and eco-innovation, (2) circular economy adoption, (3) digital transformation for sustainability, (4) green supply chain management, and (5) sustainable performance measurement. Trend topic analysis reveals evolutionary shifts from foundational manufacturing concepts (2014-2018) toward innovation-driven sustainability and digital transformation themes (2022–2024). The study identifies critical research gaps including limited investigation of green finance mechanisms, underrepresentation of developing economy contexts, and insufficient policy-practice integration frameworks. This comprehensive intellectual mapping provides strategic guidance for researchers, policymakers, and practitioners engaged in advancing SME contributions to sustainable economic transitions.

Keywords: Circular Economy, Digital Transformation, Green Economy, Green Innovation, Small and Medium Enterprises

I. INTRODUCTION

The imperative for sustainable economic transformation has intensified as societies confront escalating environmental pressures, including climate change, biodiversity loss, and resource depletion (Sabando-Vera et al., 2025). In response, the green economy has gained prominence as a policy and business framework that seeks to promote economic growth while reducing environmental risks and improving human well-being (Valache-Dărîngă et al., 2025). Within this transition, small and medium enterprises (SMEs) are central actors. SMEs constitute a large share of firms worldwide and provide a significant proportion of employment in many economies (Kannan & Gambetta, 2025). At the same time, their aggregated environmental impacts, through energy use, production processes, logistics, and waste, make their participation in green transitions consequential for achieving sustainability targets (Olekanma et al., 2024). Global emissions trends remain a key backdrop; the International Energy Agency reported record-high CO2 emissions in 2023, although growth slowed relative to prior years (Jennifer, 2024). Market projections also indicate expanding investment in green technology and sustainability solutions (Fortune Business Insights, 2024). The evolution of green entrepreneurship reflects longer historical shifts linking business strategy and environmental stewardship (Jones, 2017) and connects with SDG-oriented value creation debates (Schmiedeknecht, 2020). National platforms increasingly promote green entrepreneurship among SMEs, illustrating how policy and industry actors frame opportunities for greener enterprise development (Confederation of Indian Industry, 2024). Evidence syntheses also highlight the role of government initiatives and policy instruments in shaping green entrepreneurship models (Suresh et al., 2024). Related scholarship emphasizes green entrepreneurship as a pathway for aligning SME innovation with sustainability goals (Odeyemi et al., 2024; Singh et al., 2025), and proposes archetypes for sustainable business models that SMEs can adapt in practice (Bocken et al., 2014; Gupta & Dharwal, 2022).

Scholarly interest in the relationship between SMEs and the green economy has expanded rapidly, reflecting increasing policy attention to sustainable production and the recognition of SMEs as potential catalysts of innovation and inclusive growth (Sikandar et al., 2024). Early research in this area often focused on environmental management practices in small firms. More recent work has broadened toward themes such as green innovation, eco-entrepreneurship, circular economy adoption, and the role of digital technologies in enabling sustainable transitions (Magableh et al., 2025; Arora et al., 2023; Kirkwood & Walton, 2010; York & Venkataraman, 2010; Kamal & Jasni, 2023). While this growth has enriched the field, it has also produced a diverse and dispersed body of literature, making it difficult to clearly identify dominant themes, influential intellectual foundations, and emerging research frontiers.

For SMEs, the shift toward greener economic practices presents both opportunities and constraints. On one hand, green innovation and resource efficiency can improve competitiveness, reduce long-run costs, and open access to markets for sustainable products and services (Ferreira et al., 2023). On the other hand, SMEs often face barriers such as limited financing, inadequate technical capabilities, weak external networks, and inconsistent policy support—constraints that are frequently more pronounced in developing economies (Mishra et al., 2024). Global assessments also highlight the potential economic value of circular and green transitions, yet the capacity of SMEs to participate meaningfully depends on institutional support, access to finance, skills development, and technology diffusion (United Nations Economic Commission for Europe, 2024). Given the expanding and multidisciplinary nature of this research domain, bibliometric and systematic mapping approaches provide useful tools for synthesizing evidence at scale. Bibliometric analysis applies quantitative techniques to bibliographic metadata to describe publication growth, collaboration structures, influential sources, and thematic evolution within a research field (Donthu *et al.*, 2021; Ellili, 2024). In contrast to narrative reviews that typically prioritize depth within a narrower scope, bibliometric mapping is particularly suitable for identifying broad patterns, conceptual clusters, and emerging topics across large corpora of publications.

Despite the increasing volume of scholarship, comprehensive bibliometric mapping of the SMEs and green economy knowledge base remains limited, especially for the most recent decade. A small number of bibliometric and systematic reviews have examined related sub-themes: Sabando-Vera et al. (2025) conducted a bibliometric analysis of green innovation in SMEs, Sikandar et al. (2024) mapped eco-innovation practices through a systematic literature review, Martínez-Peláez et al. (2024) reviewed digital transformation roadmaps for SME sustainability, and Mishra et al. (2024) examined enablers and barriers to circular economy adoption in micro, small, and medium enterprises. Maesaroh et al. (2024) provided the closest antecedent to the present study by synthesizing green economy research trends in SMEs between 1997 and 2022 using bibliometric techniques, identifying sustainable development as a recurrent focus. However, their analysis predated the significant 2022-2024 publication surge and did not incorporate the thematic evolution and keyword co-occurrence mapping employed here. Accordingly, there remains a need for an updated, integrative bibliometric mapping that captures the recent acceleration of publications and clarifies how thematic emphases, collaboration patterns, and intellectual structures have evolved during 2014 to 2024.

Accordingly, this study provides a systematic bibliometric analysis of global scholarly output on SMEs and the green economy between 2014 and 2024. It is guided by three research questions. First, how has scholarly output on SMEs and the green economy evolved from 2014 to 2024 in terms of publication growth, geographic distribution, and disciplinary orientation? Second, what dominant themes, conceptual clusters, and keyword patterns characterize the literature during this period? Third, what key research gaps and future directions emerge from the bibliometric landscape, particularly concerning underexplored themes, regional imbalances, and methodological limitations that could guide future scholarship on SME engagement in the green economy. In answering these questions, the study offers an updated intellectual map of the field, highlights emerging research frontiers, and informs both scholarship and policy debates on enabling SME participation in green economic transformation. The remainder of the paper is organized as follows. Section 2 outlines the methodological approach, Section 3 presents results, Section 4 discusses findings in relation to prior work, and Section 5 concludes with implications and recommendations.

1.1 Research Objectives

Building on the research gaps and research questions identified, this study pursues three specific objectives;

(i) To examine the evolution of scholarly output on SMEs and the green economy from 2014 to 2024, including trends in publication growth, geographic distribution, and disciplinary orientation.

(ii) To identify and map the dominant themes, conceptual clusters, and keyword co-occurrence patterns that characterise the intellectual structure of the SMEs and green economy literature during this period.

(iii) To detect key research gaps and emerging directions within the bibliometric landscape, with particular attention to underexplored themes, regional imbalances, and methodological limitations, in order to guide future scholarship and inform policy on SME engagement in the green economy.

II. THEORETICAL REVIEW

Bibliometric studies are often descriptive, mapping publication trends and thematic structures without anchoring findings in theoretical reasoning. However, interpreting why particular research themes emerge, cluster together, and evolve over time requires a conceptual foundation. This section introduces five theoretical perspectives selected as interpretive lenses for the bibliometric findings and then examines how they interact in relation to the study's objectives.

2.1 Theoretical Foundations

Five theoretical perspectives are employed: the natural resource-based view, institutional theory, dynamic capabilities theory, stakeholder theory, and circular economy theory. Their selection follows two criteria. First, each addresses a distinct dimension of SME engagement with the green economy, namely internal resources, external pressures, adaptive processes, relational demands, and systems level redesign, together providing comprehensive analytical coverage. Second, each map directly onto at least one of the five thematic clusters identified through keyword co-occurrence analysis, enabling theoretically grounded interpretation rather than purely descriptive reporting.

The natural resource-based view (NRBV) extends the resource-based view of the firm (Barney, 1991) by arguing that sustained competitive advantage can be built through capabilities oriented toward environmental sustainability, specifically through pollution prevention, product stewardship, and sustainable development strategies (Hart, 1995). For SMEs, the NRBV explains how firms with constrained resources may still pursue green innovation when they develop distinctive internal capabilities such as environmental knowledge, managerial commitment, and absorptive capacity for green technologies (Ferreira et al., 2023). This lens underpins much of the scholarship within the green innovation and eco innovation cluster (Cluster 1), where researchers examine how internal resource configurations enable or constrain environmentally oriented competitive strategies.

Institutional theory explains how organisations conform to or resist external pressures from regulatory, normative, and cognitive institutional environments (DiMaggio & Powell, 1983; Scott, 2014). Coercive pressures from environmental legislation, mimetic pressures from competitor behaviour, and normative pressures from professional associations and supply chain partners collectively shape the pace of green transitions in SMEs. This perspective is essential for interpreting geographic patterns in the bibliometric data, as differences in regulatory stringency and policy frameworks across countries help explain why regions with strong sustainability agendas, such as the European Union and China, generate higher volumes of research on SME greening. Alternative theories such as transaction cost economics were considered but offer narrower scope, focusing on governance efficiency rather than the broader institutional forces driving sustainability adoption across diverse national contexts.

Dynamic capabilities theory (Teece, 2007) focuses on a firm's ability to sense emerging opportunities, seize them through strategic investment, and transform existing asset bases to maintain competitiveness in changing environments. This framework illuminates how SMEs adapt to evolving environmental regulations, emerging green markets, and technological disruption. It is particularly pertinent to the digital transformation and sustainability cluster (Cluster 3), where scholars explore how SMEs develop and deploy digital capabilities, including data analytics, Industry 4.0 technologies, and digitalised supply chain management, to enhance environmental performance (Martínez-Peláez et al., 2024).

Stakeholder theory (Freeman, 1984) holds that organisational strategy should account for the interests of all parties affected by or capable of affecting the firm. For SMEs in the green economy, pressures from customers, regulators, investors, and supply chain partners represent significant drivers of sustainability adoption. This perspective is central to the green supply chain management cluster (Cluster 4) and the sustainable performance and ESG integration cluster (Cluster 5), where research examines how downstream demands from large buying firms and upstream expectations from regulators incentivise SMEs to adopt greener practices (Sikandar et al., 2024).

Circular economy theory provides a systems level perspective that reframes economic activity from the linear "take, make, dispose" model toward closed loop systems emphasising resource reuse, recycling, and regeneration (Geissdoerfer et al., 2017; Kirchherr et al., 2017). Unlike the preceding firm level theories, it operates at inter organisational and systems levels, addressing how networks of firms can collectively restructure material and energy flows. This perspective underpins the circular economy adoption cluster (Cluster 2), encompassing scholarship on waste management, industrial symbiosis, and the barriers and enablers of circular business model transitions in resource constrained firms (Arsawan et al., 2025; Mishra et al., 2024).

2.2 Theoretical Interactions and Relevance to the Study Objectives

The explanatory power of these perspectives is amplified when considered in interaction. This subsection outlines how they relate to one another and how, jointly, they inform interpretation across the study's three objectives.

Regarding the first objective, examining the evolution of scholarly output in terms of growth, geographic distribution, and disciplinary orientation, institutional theory provides the primary interpretive lens. The acceleration of publications after 2020 reflects intensifying coercive pressures including net zero commitments, the European Green

Deal, and China's dual carbon targets. Geographic concentration in countries with strong regulatory frameworks mirrors the institutional conditions that generate both research demand and funding. The NRBV complements this by explaining why SME specific research has grown faster than general sustainability scholarship: as policy mandates create external pressure, the question of whether SMEs possess the internal resources to respond becomes a pressing research concern. The intersection of institutional pressure and resource constraints thus helps explain both the growth trajectory and the disciplinary breadth of the field.

Regarding the second objective, identifying dominant themes and conceptual clusters, the theoretical interactions become most visible. The NRBV explains what drives green innovation within the firm (Cluster 1), while institutional theory explains why firms innovate, because external pressures demand it. Dynamic capabilities theory then explains how firms sustain innovation over time by reconfiguring resources and routines, linking the green innovation cluster to the digital transformation cluster (Cluster 3). Stakeholder theory bridges the internal focus of the NRBV with external demands captured by institutional theory, explaining the relational mechanisms, such as supply chain pressure, customer expectations, and investor scrutiny, through which sustainability demands reach SMEs (Clusters 4 and 5). Circular economy theory, operating at the systems level, provides the overarching framework connecting individual SME actions to broader resource circulation networks (Cluster 2). These interactions suggest that the thematic clusters reflect not just keyword co-occurrence but theoretically coherent streams of inquiry addressing different levels of analysis and different stages of the sustainability transition process.

Regarding the third objective, detecting research gaps and emerging directions, the theoretical framework highlights where interactions between perspectives remain underexplored. Three gaps are particularly salient. First, the interface between institutional theory and circular economy theory is underdeveloped: while institutional pressures drive circular practices, the specific policy designs that most effectively support circular transitions in SMEs remain poorly understood, a gap reflected in the weak presence of green finance keywords in the bibliometric data. Second, the connection between dynamic capabilities and the NRBV in developing economy contexts is largely unexamined, as most research on green dynamic capabilities has been conducted in advanced economies where digital infrastructure and institutional support are well established. Third, stakeholder theory and circular economy theory intersect at the level of inter firm collaboration and industrial symbiosis, yet the bibliometric analysis reveals limited integration of these streams, suggesting that the relational mechanisms enabling circular economy networks among SMEs remain a frontier for future inquiry.

III. METHODOLOGY

3.1 Research Design

This study adopts a systematic bibliometric analysis as a quantitative approach for examining bibliographic records to identify patterns, trends, and relationships within the scholarly literature (Zhang et al., 2024). Bibliometric analysis has become established in management and sustainability research as a rigorous method for mapping scientific fields, identifying intellectual structures, and detecting emerging research themes (Kirby, 2023). The methodological logic follows the systematic review protocol proposed by Tranfield et al. (2003) and the bibliometric procedures operationalized in bibliometrix and Biblioshiny (Aria & Cuccurullo, 2017). The analysis integrates two complementary components: performance analysis, used to describe research productivity and influence indicators across years, sources, countries, and subject areas; and science mapping, applied to visualize conceptual structures and thematic relationships through network-based techniques.

3.2 Data Sources and Search Strategy

Bibliographic data were retrieved primarily from Scopus because it provides broad coverage of peer reviewed literature and exports standardised metadata suitable for bibliometric analysis (Fahimnia et al., 2015). Scopus was prioritised due to its strong representation in business, management, environmental science, and sustainability outlets, which are central to interdisciplinary work on SMEs and green economy transitions (Valache-Dărîngă et al., 2025). Google Scholar was consulted as a supplementary source to expand coverage, particularly for conference proceedings and other materials that may be less consistently indexed in Scopus. The Scopus search was executed using the following Boolean string applied to titles, abstracts, and keywords: TITLE ABS KEY (("small and medium enterprises" OR "small and medium sized enterprises" OR "SMEs" OR "SME") AND ("green economy" OR "green growth" OR "green transition" OR "low carbon economy" OR "sustainable economy" OR "ecological modernization" OR "green transformation" OR "green business models")).

The search was restricted to the period 2014 to 2024 for several substantive reasons. First, this timeframe captures the decade during which the global sustainability policy architecture underwent significant consolidation, including the adoption of the United Nations Sustainable Development Goals in 2015 and the Paris Agreement on climate change in the same year, both of which substantially shaped research agendas on green economy transitions. Second, the period encompasses the post-pandemic expansion of sustainability-related scholarship, which accelerated

interest in SME resilience and green transformation. Third, preliminary searches indicated that scholarly output specifically linking SMEs to green economy concepts was minimal prior to 2014, with most foundational works on general environmental management in small firms preceding this intersection. While seminal earlier works on SME sustainability exist, they predate the conceptual consolidation of the SME-green economy nexus as a distinct research domain. To manage potential overlap between databases, duplicate records were identified by matching document titles and DOIs across Scopus and Google Scholar exports. Identified duplicates were removed manually, retaining the Scopus record where metadata were more complete. Records were exported with full bibliographic information, including authors, titles, abstracts, keywords, source titles, affiliations, references, and citation information, to support both performance analysis and science mapping.

3.3 Inclusion and Exclusion Criteria

Eligibility was guided by PRISMA principles for transparent screening and reporting (Page *et al.*, 2021). Records were included if they met the following criteria. First, the publication year fell between 2014 and 2024. Second, the document type was limited to articles, conference papers, reviews, and book chapters. Third, the publication language was English to ensure analytical consistency in keyword standardisation and thematic interpretation. Fourth, documents were required to have reached a final publication stage. Fifth, the content had to demonstrate substantive relevance to SMEs and green economy related concepts, including circular economy, green innovation, eco innovation, sustainable development, environmental sustainability, green entrepreneurship, digital transformation, and green finance. Records were excluded when SMEs were not a central unit of analysis, when green economy related concepts were mentioned only tangentially, or when bibliographic metadata were insufficient for analysis. After screening and cleaning, the final dataset comprised 851 documents and was used for all analyses.

3.4 Analytical Tools and Techniques

Two complementary tools were employed. VOSviewer version 1.6.20 was used to construct and visualise bibliometric networks, including keyword co-occurrence networks and cluster structures based on association strength (van Eck & Waltman, 2010). Keyword co-occurrence analysis was applied to reveal dominant thematic clusters and conceptual linkages in the literature. Biblioshiny, the graphical interface of the bibliometrix package, was used for additional analyses including thematic evolution, trend topics, country collaboration networks, and conceptual structure mapping (Aria & Cuccurullo, 2017). Descriptive statistical procedures were used to summarise publication trends, geographic distributions, source characteristics, and related indicators derived from the metadata.

3.5 Analytical Framework

The analytical framework operationalised three levels of analysis aligned with the research questions, as summarised in Table 1. First, productivity and descriptive analysis examined annual publication volume, country level contributions, subject area classifications, and selected metadata indicators to characterise the field's developmental trajectory. Second, conceptual structure analysis employed keyword co-occurrence mapping and thematic clustering to identify dominant themes and their interrelationships. Third, gap identification and interpretive synthesis integrated evidence from the descriptive and mapping stages to identify underexplored topics, regional imbalances, and methodological patterns that inform future research directions.

Table 1

Analytical Framework Aligned with Research Questions

Research question	Type of analysis	Key variables or indicators	Tools	Insights expected
RQ1: Evolution of scholarly output	Productivity and descriptive analysis	Annual publication volume; country level productivity; subject area classification	Scopus metadata; Biblioshiny	Trends in research growth; regional leadership; disciplinary positioning
RQ2: Dominant themes and conceptual clusters	Conceptual structure analysis	Keyword co-occurrence; thematic clusters; thematic evolution	VOSviewer; Biblioshiny	Core themes; topic clusters; shifts in conceptual focus
RQ3: Research gaps and future directions	Gap identification and interpretive synthesis	Low frequency keywords; regional underrepresentation; methodological patterns	Qualitative synthesis of RQ1 and RQ2 outputs; low-frequency keyword analysis; cross-referencing of thematic gaps with regional and methodological patterns of RQ1 and RQ2 findings	Underexplored themes; methodological limitations; strategic areas for future research

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Publication Trends and Growth Patterns

The systematic bibliometric analysis reveals substantial and accelerating growth in scholarly output on SMEs and the green economy over the study period. Figure 1 presents the annual distribution of publications, indicating a seventeen fold increase from 13 documents in 2014 to 223 documents in 2024.

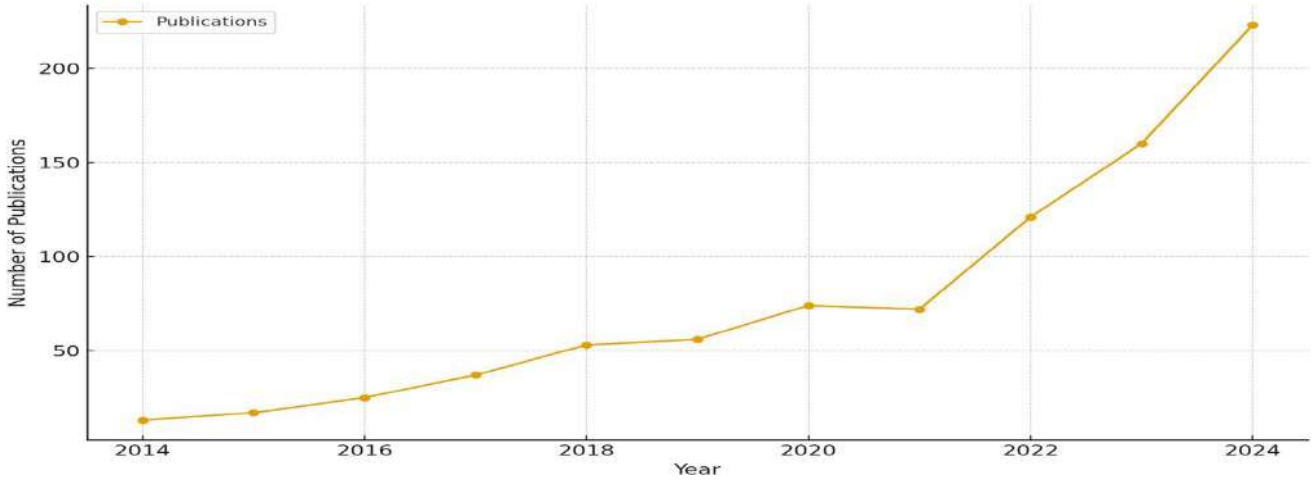

Figure 1

Annual Publication Trends on SMEs and Green Economy (2014-2024)

The growth trajectory displays three phases. The emergence period from 2014 to 2017 shows modest but steady growth, with annual publications averaging 23 documents. The acceleration period from 2018 to 2020 shows increased output from 53 to 74 documents annually, suggesting rising recognition of SME sustainability as a research priority. The expansion period from 2021 to 2024 shows rapid growth, culminating in 223 publications in 2024. The compound annual growth rate for the overall period is approximately 33 percent, which is higher than growth rates commonly reported for broader sustainability literature as presented in table 2

Table 2

Annual Distribution of Publications on SMEs and Green Economy (2014-2024)

Year	Number of Documents	Cumulative Total	Year-on-Year Growth (%)
2014	13	13	-
2015	17	30	30.8
2016	25	55	47.1
2017	37	92	48.0
2018	53	145	43.2
2019	56	201	5.7
2020	74	275	32.1
2021	72	347	-2.7
2022	121	468	68.1
2023	160	628	32.2
2024	223	851	39.4

The post 2020 surge coincides with several contextual developments, including intensified climate policy discourse following Paris Agreement implementation timelines, increased corporate attention to Environmental, Social, and Governance reporting, and the COVID 19 pandemic's highlighting of supply chain vulnerabilities and sustainability imperatives (Liu et al., 2025). The temporary decline in 2021 may reflect pandemic related research disruption, followed by a robust recovery and acceleration. A life cycle curve fitted to the publication series, shown in Figure 2, indicates that the field remains in a growth phase. The projection suggests an inflection in the early 2030s. However, these forward estimates should be interpreted as indicative rather than predictive because they depend on model assumptions and the stability of recent growth dynamics. Figure 2. Life cycle analysis of SMEs and green economy research showing annual publications with logistic fit projection and cumulative growth curve.

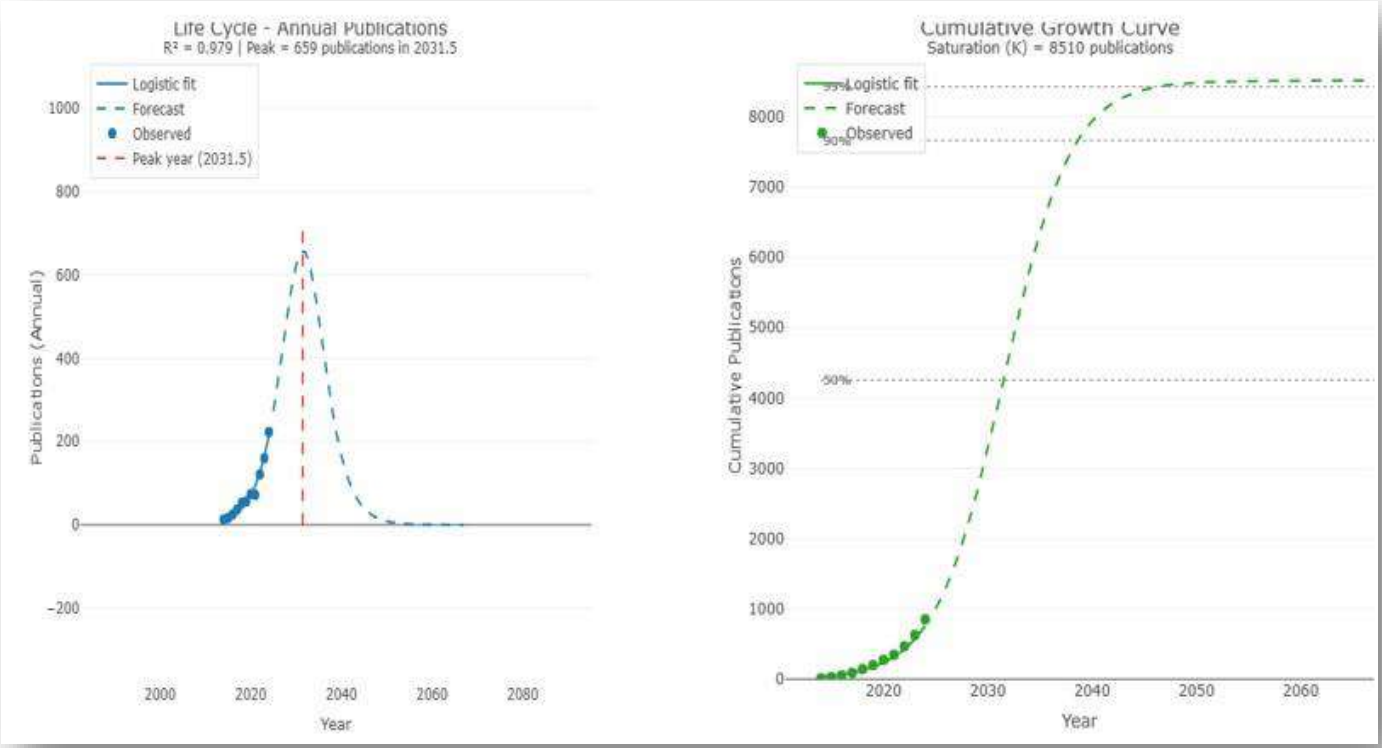

Figure 2
Life Cycle Analysis of SMEs and Green Economy Research

Figure 2. Life cycle analysis of SMEs and green economy research: (a) Annual publications with logistic fit projection; (b) Cumulative growth curve with saturation estimate.

4.1.2 Geographic Distribution of Research

Analysis of country level productivity reveals a concentrated geographic distribution with notable variation in research intensity. Figure 3 presents a world map visualisation of research output by country, with darker shading indicating higher publication volumes.

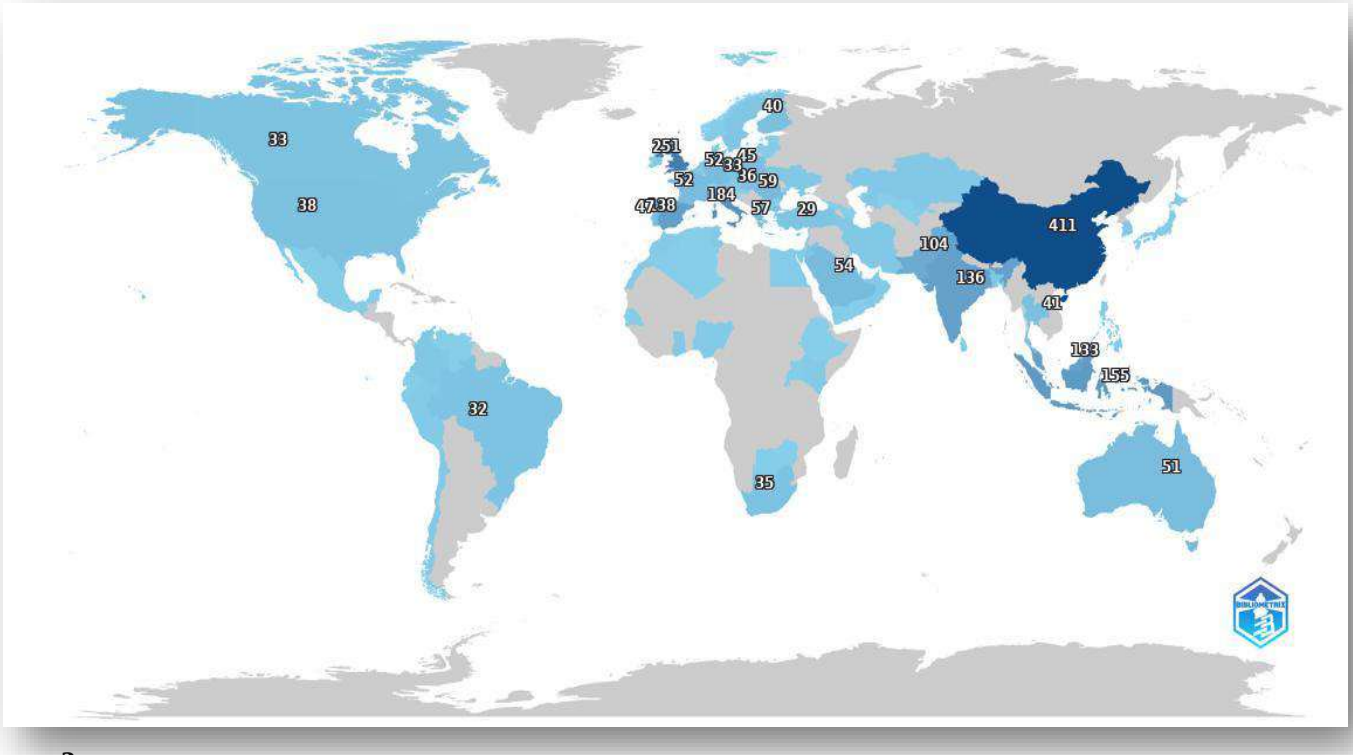

Figure 3
Geographic Distribution of Global Scholarly Output on SMEs and Green Economy (2014-2024)

Numbers indicate total publications per country. Table 3 presents country frequencies for the top contributing nations. It is important to note that country counts reflect author affiliation information. When a publication includes co-authors from multiple countries, the same document can be counted under more than one country. Consequently, country percentages should not be interpreted as mutually exclusive shares of the dataset. An examination of international collaboration patterns reveals that China–United Kingdom, China–United States, and United Kingdom–Italy represent the most frequent co-authorship linkages, suggesting that research collaboration in this domain tends to bridge major knowledge-producing economies. European countries show particularly dense intra-regional collaboration networks, likely facilitated by joint funding mechanisms such as Horizon 2020. Notably, collaboration between developed and developing economy researchers remains comparatively limited, representing an opportunity for future knowledge exchange.

Table 3

Geographic Distribution of Research Output (Top 25 Countries)

Rank	Country	Frequency	% of Total
1	China	411	48.3
2	United Kingdom	251	29.5
3	Italy	184	21.6
4	Indonesia	155	18.2
5	Spain	138	16.2
6	India	136	16.0
7	Malaysia	133	15.6
8	Pakistan	104	12.2
9	Romania	59	6.9
10	Greece	57	6.7
11	Saudi Arabia	54	6.3
12	France	52	6.1
13	Germany	52	6.1
14	Australia	51	6.0
15	Portugal	47	5.5

European countries collectively show substantial research activity, which may reflect the influence of regionally anchored sustainability agendas, including policy packages oriented toward green growth and circular economy transitions. The prominence of emerging economies such as Indonesia, India, Malaysia, and Pakistan indicate growing scholarly attention to developing country contexts where SMEs play vital roles in employment and economic development.

4.1.3 Disciplinary Distribution

Analysis of subject area classifications reveals the interdisciplinary nature of SMEs and green economy research. Figure 4 presents the distribution of publications across academic disciplines.

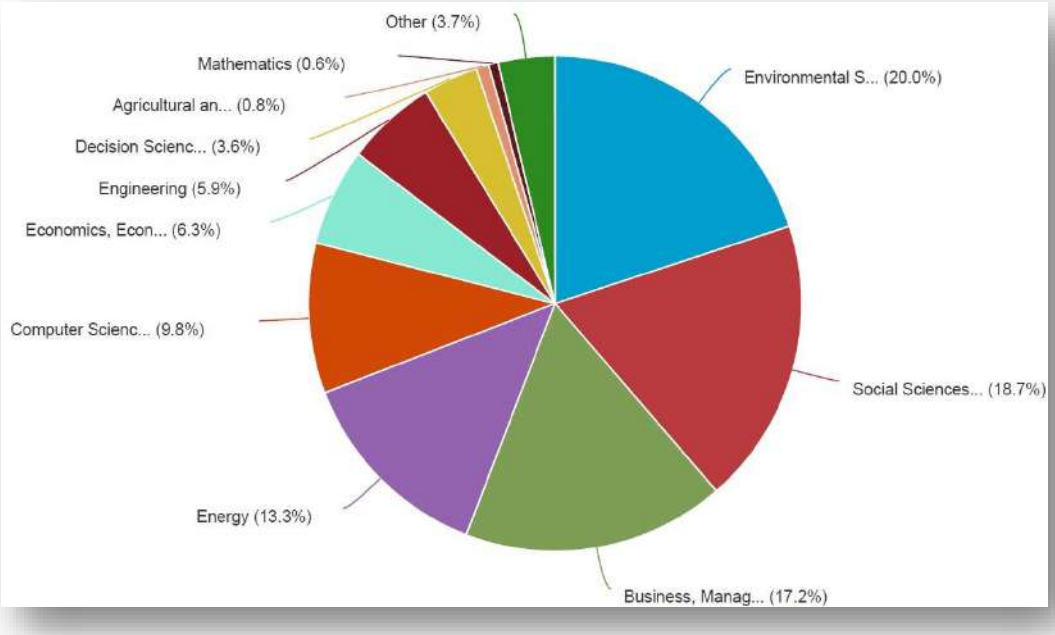

Figure 4

Distribution of Publications by Subject Area Classification.

Environmental Science represents the largest share at 20.0 percent, followed by Social Sciences at 18.7 percent, Business, Management and Accounting at 17.2 percent, and Energy at 13.3 percent. Computer Science accounts for 9.8 percent of publications, reflecting the expanding integration of digital technologies within sustainability research agendas. Engineering at 5.9 percent, Economics at 6.3 percent, and Decision Sciences at 3.6 percent further indicate the field's multidisciplinary foundations. Since Scopus can assign a single document to more than one subject area, the category percentages should be interpreted as overlapping classifications rather than mutually exclusive partitions.

4.1.4 Source Analysis and Publication Venues

Analysis of publication sources reveals concentration in high-impact sustainability and business journals. Figure 5 presents the cumulative publication trends for the top five contributing journals.

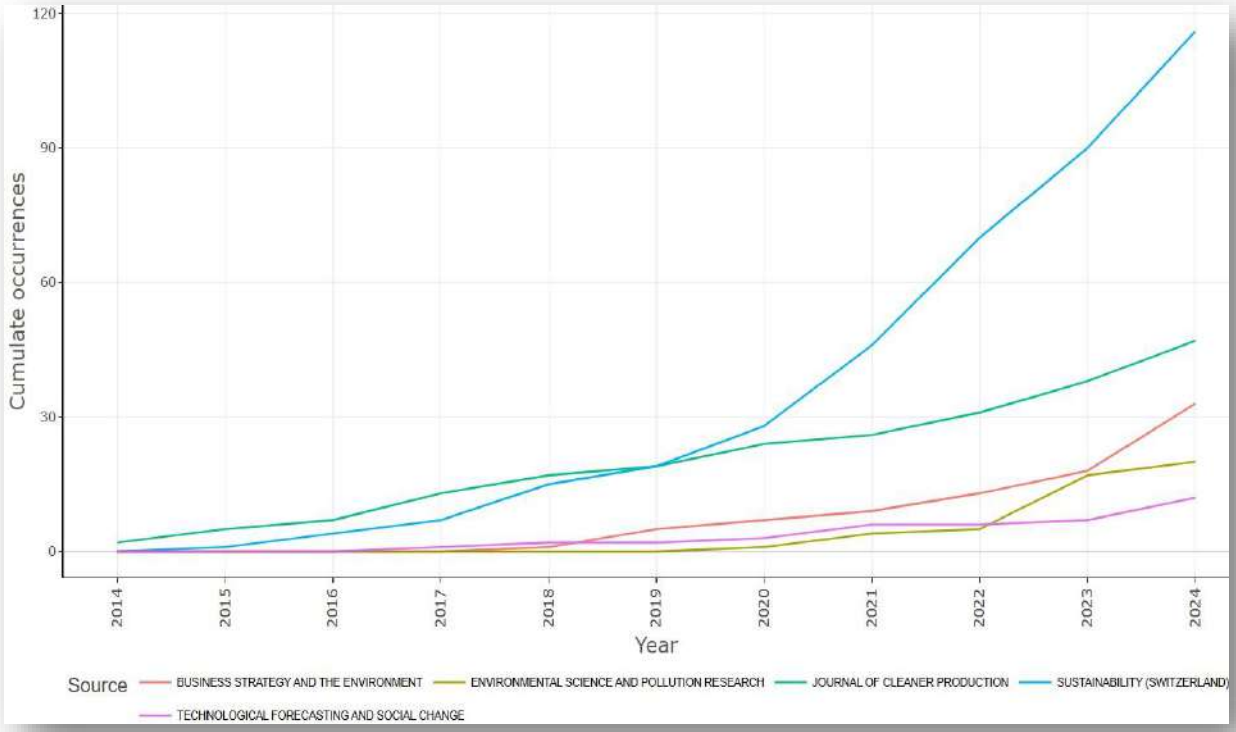

Figure 5

Cumulative Publication Trends by Leading Source Journals (2014-2024)

Sustainability (Switzerland) emerges as a leading publication venue with pronounced growth after 2020, followed by Journal of Cleaner Production and Business Strategy and the Environment. The prominence of these outlets indicates strong engagement across both environmental science and business management communities. Technological Forecasting and Social Change and Environmental Science and Pollution Research show accelerating publication patterns in recent years, reflecting growing interest in the interface between technological change and sustainability transitions.

4.1.5 Thematic Clusters and Conceptual Structure

Keyword co-occurrence analysis conducted in VOSviewer identified distinct thematic clusters that structure the intellectual landscape of SMEs and green economy research. Figure 6 presents the keyword co-occurrence network visualization with overlay coloring that reflects temporal patterns.

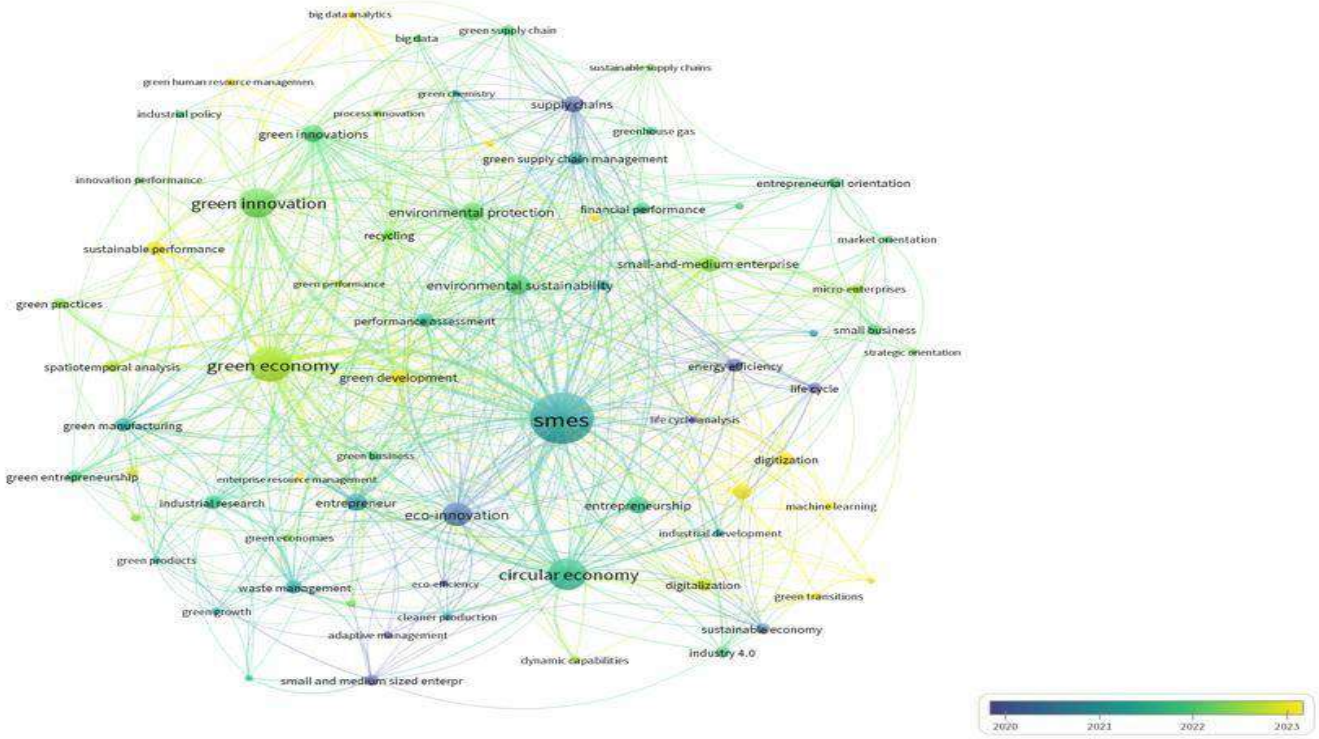

Figure 6

Keyword co-occurrence network visualization with temporal overlay. Node size represents keyword frequency; colors indicate average publication year (blue: earlier; yellow: recent). Generated using VOSviewer 1.6.20.

The visualization reveals five dominant thematic clusters organized around central nodes:

Cluster 1, green innovation and eco innovation. This core cluster focuses on how SMEs develop and implement environmentally beneficial innovations in products, processes, and business models. High frequency keywords include green innovation with 91 occurrences, eco innovation with 57 occurrences, and innovation with 127 occurrences, alongside environmental sustainability. The cluster links closely with competitive advantage and sustainable performance, reflecting sustained scholarly interest in the strategic value of green innovation for SME competitiveness (Ferreira *et al.*, 2023).

Cluster 2, circular economy practices. This cluster includes circular economy, waste management, recycling, resource efficiency, and life cycle with 13 occurrences. Studies examine pathways from linear to circular business models, barriers to adoption, and the role of inter firm networks and industrial symbiosis in facilitating resource circulation (Arsawan *et al.*, 2025).

Cluster 3, digital transformation and sustainability. This emerging cluster links digital transformation with 26 occurrences, digitalization, Industry 4.0, and big data analytics to sustainability related performance outcomes. The temporal overlay indicates that this cluster has gained prominence most recently, suggesting an active research frontier. Evidence indicates that the integration of digital capabilities with sustainability practices can help SMEs respond to growing demand for environmentally responsible business models (Song et al., 2025). Cluster 4, green supply chain management. This cluster connects SMEs to broader value chain sustainability concerns through keywords including supply chains with 30 occurrences, green supply chain, manufacturing with 45 occurrences, and sustainable supply chain management.

Cluster 5, sustainable performance and ESG integration. This cluster focuses on performance measurement and stakeholder expectations through keywords including sustainable development with 193 occurrences, sustainable performance with 21 occurrences, entrepreneurship, and economic development. The notably high frequency of "sustainable development" warrants comment: as an umbrella term closely tied to the United Nations Sustainable Development Goals framework, it functions as a broad conceptual anchor that spans multiple research streams. Its dominance reflects both the pervasive influence of the SDG agenda on framing research in this domain and the tendency of authors across disciplines to invoke sustainable development as a macro-level objective within which SME greening efforts are situated. Figure 7 presents the full VOSviewer interface showing the network visualization with detailed cluster analysis parameters.

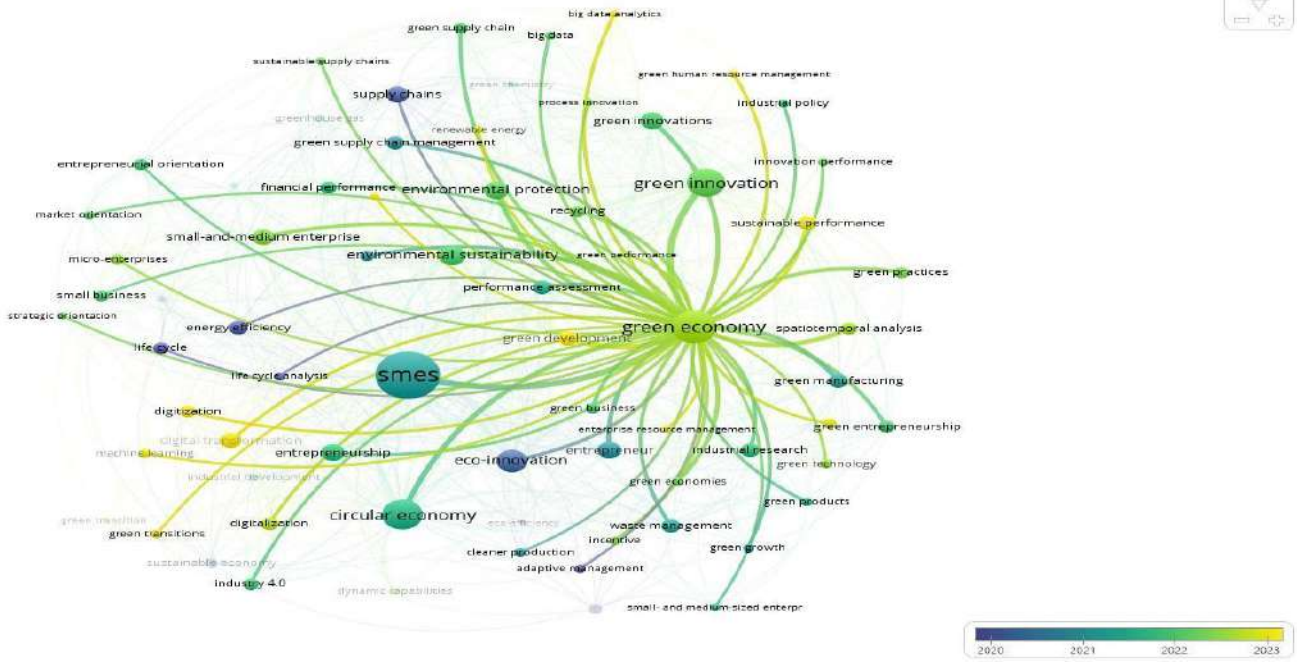

Figure 7
VOSviewer Keyword Co-Occurrence Network Analysis Interface Showing Cluster Configuration and Network Parameters.

4.1.6 Three-Field Analysis

A three field plot was generated to visualize relationships among cited references, authors, and merged keywords. Figure 8 presents the visualization, highlighting intellectual connections across the research domain.

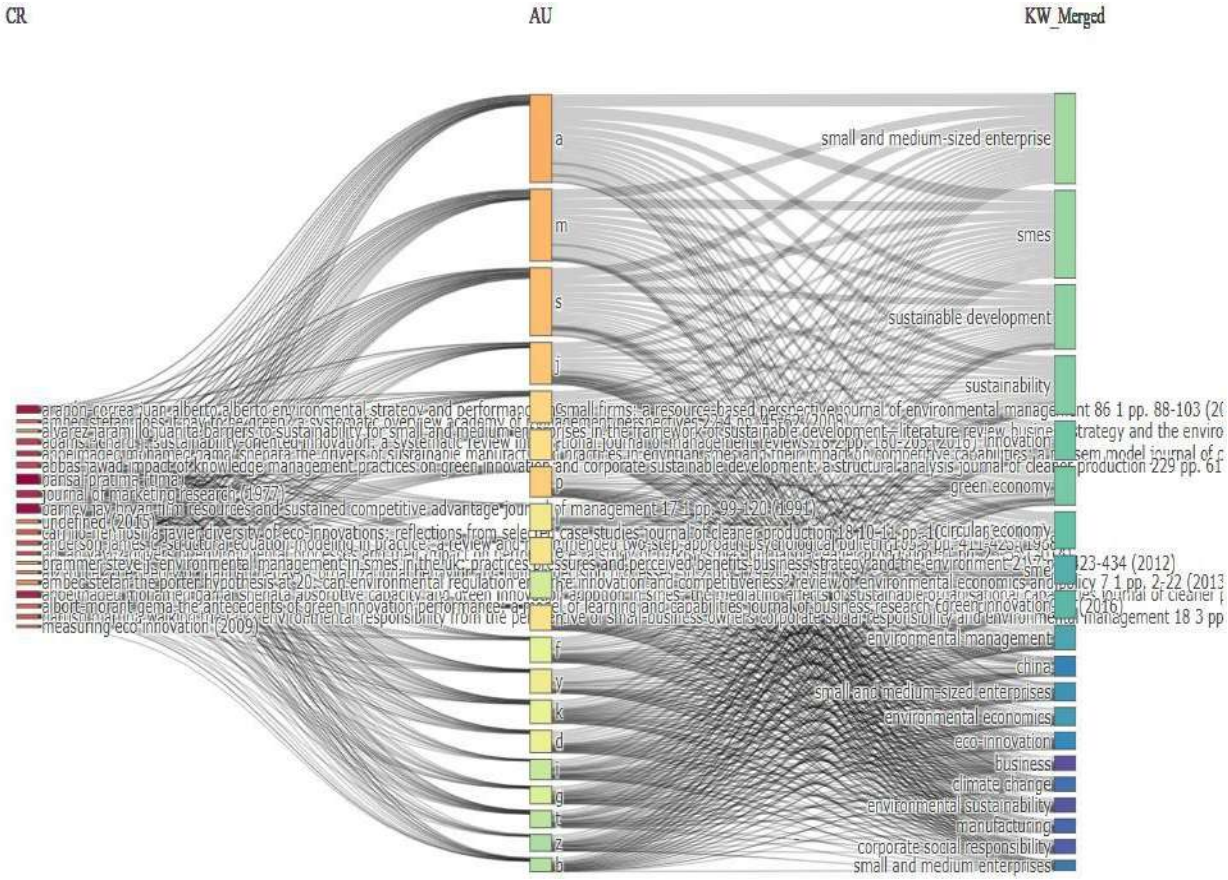

Figure 8
Three-Field Plot (Sankey diagram) Showing Relationships between Cited References (CR), Authors (AU), and Keywords (KW_Merged).

The visualization indicates strong connections between foundational work on competitive advantage, environmental strategy, and SME sustainability. Linking keywords include small and medium sized enterprise, SMEs, sustainable development, sustainability, and green economy. The plot further suggests that author groups contribute to distinct keyword domains while drawing on shared theoretical foundations.

4.1.7 Trend Topic Evolution

Temporal analysis of keyword frequencies reveals clear evolutionary patterns in research themes. Table 4 presents trend topics with frequency distributions across quartiles.

Table 4

Trend Topic Analysis (2014-2024)

Key Topic	Frequency	Year Q1	Year Median	Year Q3
Small and medium-sized enterprise	284	2020	2022	2024
SMEs	278	2019	2022	2023
Sustainable development	193	2020	2022	2024
Green economy	129	2022	2023	2024
Innovation	127	2020	2023	2024
Green innovation	91	2021	2023	2024
Eco-innovation	57	2018	2021	2023
Small and medium enterprises	50	2020	2021	2023
Manufacturing	45	2019	2021	2023
Supply chains	30	2018	2020	2023
Digital transformation	26	2023	2024	2024
Green development	23	2024	2024	2024
Sustainable performance	21	2022	2024	2024

Early period topics from 2014 to 2018 emphasized production-oriented sustainability, including manufacturing, life cycle assessment, and energy efficiency. Middle period topics from 2019 to 2021 show stronger prominence of eco innovation, supply chains, and broader SME conceptualization. Recent topics from 2022 to 2024 demonstrate thematic expansion, with green economy, green innovation, and sustainable development reaching peak frequency, accompanied by frontier themes such as digital transformation, green development, and sustainable performance.

4.1.8 Research Funding Patterns

Analysis of funding acknowledgements indicates substantial institutional support for research on SMEs and the green economy. Figure 9 presents the distribution of the most frequently acknowledged funding sponsors as derived from Scopus funding metadata.

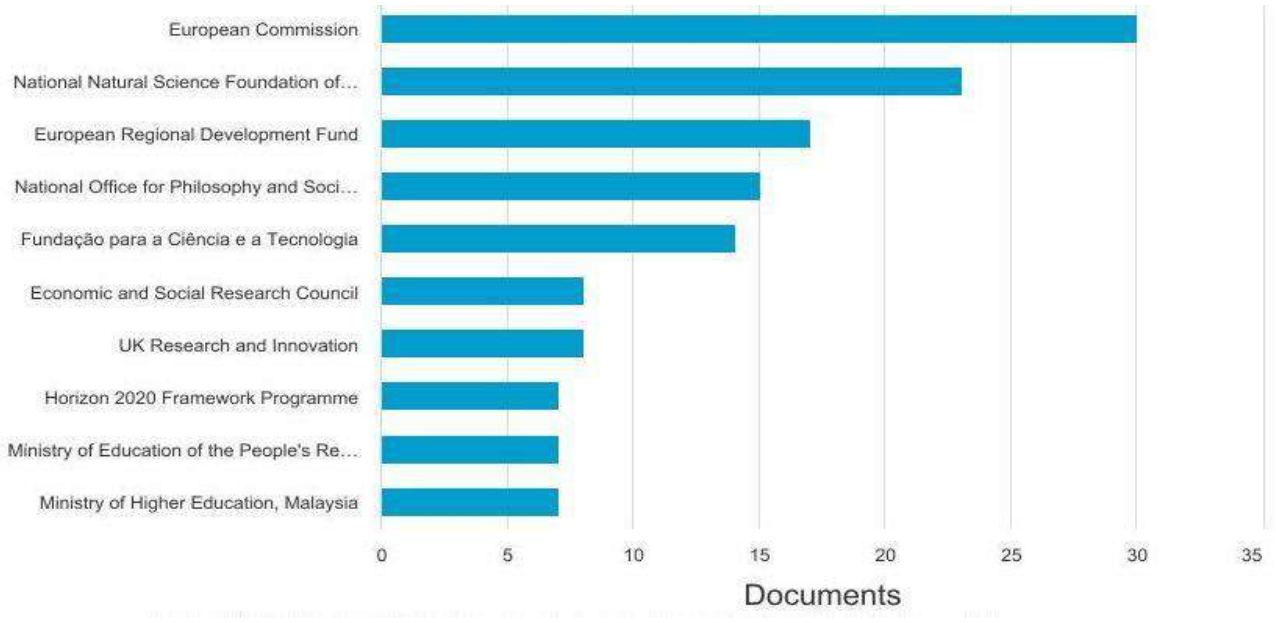

Figure 9

Distribution of research funding sponsors. Source: Scopus Analyze function.

The National Natural Science Foundation of China emerges as the most frequently acknowledged funder, consistent with China's high publication frequency. European funding programmes such as Horizon 2020 and the European Regional Development Fund also appear prominently, reflecting policy priorities related to sustainable business development. National research councils from multiple countries contribute as well, indicating broad institutional recognition of the topic's strategic relevance for economic and environmental policy objectives.

4.2 Discussion

4.1.1 Interpretation of Growth Paths

The exponential growth in publications on SMEs and the green economy reflects convergent pressures from policy, market, and societal domains demanding sustainable business practices. The 1,615% increase from 2014 to 2024 substantially exceeds growth rates in related fields such as corporate sustainability (Ellili, 2024) and green innovation broadly (Sabando-Vera *et al*., 2025), suggesting that the SME-specific focus has gained particular momentum. This growth pattern aligns with findings from Maesaroh *et al*. (2024), though the current study captures the significant 2022-2024 acceleration not included in earlier analyses.

The life cycle analysis (Figure 2) projects continued growth through approximately 2031-2032, with a saturation point around 8,510 cumulative publications. This projection suggests the field remains in an active growth phase with substantial room for continued scholarly contribution. The post-2020 surge corresponds with several contextual factors. First, the COVID-19 pandemic accelerated digital transformation research while highlighting supply chain vulnerabilities requiring sustainable solutions (Liu et al., 2025). Second, intensified climate policy commitments including net-zero pledges and the Paris Agreement's implementation timelines created policy demand for research on enterprise-level sustainability transitions. Third, growing investor attention to ESG performance placed pressure on SMEs throughout supply chains to demonstrate environmental responsibility (Jiang et al., 2023).

4.1.2 Geographic Patterns and Implications

China's dominance (48.3% of output) reflects several factors beyond population and research capacity. Government prioritization of ecological civilization and green development, crystallized in dual-carbon goals targeting carbon peak by 2030 and carbon neutrality by 2060, has created substantial research demand (Wang & Zhang, 2025). China's 43 million SMEs represent a major economic force requiring sustainability transition support, providing rich empirical contexts for research (Valache-Dărîngă et al., 2025). The National Natural Science Foundation of China's leading position among funding sources (Figure 9) reinforces the institutional commitment to this research domain. However, China's high output should also be interpreted in light of potential biases. Significant publication pressure within the Chinese academic system, where career advancement is closely tied to indexed journal output, may partly inflate publication volumes. Additionally, Scopus indexing practices may introduce an English-language bias that disproportionately captures Chinese research published in international English-language journals while underrepresenting work published in Chinese-language outlets. These considerations suggest that while China's research contribution is substantial, publication counts alone may not fully reflect the comparative research landscape.

The strong representation of Southeast Asian economies (Indonesia, Malaysia, Thailand) alongside South Asian contributors (India, Pakistan) indicates growing research interest in developing country contexts. This is significant because circular economy and green transition research has historically concentrated in developed economy settings, potentially limiting applicability to contexts with different institutional conditions (Cantú *et al*., 2021). However, the UNCTAD 2023 Trade and Environment Review notes that over 70% of developing country exports face vulnerability to environmental compliance requirements, creating urgent need for context-specific research on SME green transitions.

4.1.3 Thematic Clusters and Research Streams

The five thematic clusters identified through VOSviewer analysis (Figures 6 and 7) provide insight into the intellectual organization of this domain. The prominence of green innovation and Eco-innovation as a central cluster confirms findings from Sabando-Vera *et al*. (2025), whose systematic analysis identified 496 articles on green innovation in SMEs through 2024. This research stream has generated substantial knowledge regarding drivers, barriers, and outcomes of environmental innovation in resource-constrained organizational contexts. The emergence of digital transformation as a distinct cluster represents a significant recent development, as indicated by the yellow (recent) coloring in the overlay visualization. Studies in this area examine how technologies including cloud computing, Internet of Things, artificial intelligence, and big data analytics enable SMEs to enhance sustainability performance while maintaining competitiveness (Martínez-Peláez *et al*., 2024). Chen *et al*. (2025) demonstrate that digital transformation partially mediates the relationship between green innovation and ESG performance, highlighting synergistic effects between digitalization and sustainability that merit further investigation. The three-field analysis (Figure 8) reveals how foundational theoretical works on competitive advantage, environmental strategy, and resource-based perspectives

connect to contemporary research themes. This intellectual architecture suggests the field has developed robust theoretical foundations while continuing to expand into new application domains.

Despite substantial growth, several significant gaps warrant attention based on the analysis. First, green finance mechanisms for SMEs remain underexplored despite their critical importance for enabling sustainability investments. The keyword co-occurrence analysis supports this observation: terms such as "green finance," "green bonds," and "sustainability-linked lending" appeared with very low frequency in the dataset, and none emerged as central nodes in any of the five thematic clusters (Figures 6 and 7). While research has examined general financial barriers, specific investigation of green finance instruments including green bonds, sustainability-linked loans, and impact investing adapted for SME contexts represents a notable gap (Agrawal et al., 2024). Jiang et al. (2025) demonstrate that green finance can promote energy saving and emission reduction in SME supply chains, but comprehensive frameworks for green finance access remain underdeveloped. Third, policy-practice integration frameworks are notably absent. While numerous studies identify policy needs and recommend governmental interventions, systematic frameworks for designing, implementing, and evaluating SME-focused green economy policies remain underdeveloped (Doran et al., 2023). For example, future research could develop integrated frameworks that combine green certification programs for SMEs with tiered tax incentives linked to environmental performance benchmarks, or design public-private partnership models for green technology transfer that include mentorship components, shared infrastructure for clean production, and performance monitoring systems. Action research approaches that embed researchers within policy implementation processes would be particularly valuable for generating actionable knowledge. Fourth, longitudinal research examining SME sustainability journeys over time is scarce. The predominance of cross-sectional studies limits understanding of how sustainability practices evolve, what triggers transformation processes, and how outcomes develop over extended periods (Magableh *et al*., 2025). Longitudinal designs would enable causal inference regarding intervention effectiveness.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This systematic bibliometric analysis has mapped the global scholarly landscape on SMEs and the green economy from 2014 to 2024, drawing on 851 documents from Scopus and Google Scholar. The field has experienced remarkable growth at a compound annual rate of 33%, with publication output increasing from 13 documents in 2014 to 223 in 2024. Research activity is geographically concentrated in China, the United Kingdom, and Italy, though emerging economies are contributing an increasing share. Five dominant thematic clusters structure the intellectual landscape: green innovation and eco-innovation, circular economy practices, digital transformation for sustainability, green supply chain management, and sustainable performance measurement. The field has evolved from foundational manufacturing-oriented themes toward innovation-driven and digitally enabled sustainability research. Critical gaps persist in green finance mechanisms, developing economy representation, policy-practice integration, and longitudinal research designs.

5.2 Recommendations

Based on the identified gaps, the following recommendations are presented in order of priority, corresponding to the most critical lacunae in the current literature: *Green Finance Research:* Researchers should expand investigation of green finance instruments and mechanisms specifically designed for SME contexts, examining how sustainability-focused financing can overcome resource barriers to green transitions. Studies should investigate Islamic green finance, crowdfunding for sustainability, and public-private financing mechanisms. *Developing Economy Focus:* Increased research attention to developing economy contexts is warranted to generate knowledge relevant to diverse institutional and market conditions. Comparative studies examining how SME green transition strategies differ across development contexts would be particularly valuable. *Policy Integration:* Research should more directly engage with policy processes to develop actionable frameworks for designing and implementing SME sustainability support programs. Action research and policy experimentation studies could bridge academic research and practical implementation. *Longitudinal Designs:* Adoption of longitudinal research designs would enable tracking sustainability transformation processes over time and support causal inference regarding intervention effectiveness. *Integrative Frameworks:* Development of frameworks integrating green innovation, digital transformation, and circular economy perspectives would provide holistic understanding of SME sustainability transitions and their interactions.

For policymakers, the analysis suggests several priorities. Targeted green finance programs addressing SME-specific constraints could unlock sustainability investments currently blocked by financial barriers. Technology support initiatives helping SMEs leverage digital tools for sustainability could accelerate green transitions while enhancing

competitiveness. Policy frameworks should recognize the interconnected nature of green innovation, circular economy, and digital transformation, designing integrated support rather than siloed programs. For practitioners, the analysis highlights importance of engaging with emerging themes including digital transformation and circular economy practices. SME managers should consider how sustainability investments can generate competitive advantages through innovation, efficiency gains, and market positioning. Collaboration with research institutions, industry associations, and policy programs can provide access to knowledge and resources supporting sustainability transitions.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

Agrawal, R., Agrawal, S., Samadhiya, A., Kumar, A., Luthra, S., & Jain, V. (2024). Adoption of green finance and green innovation for achieving circularity: An exploratory review and future directions. *Geoscience Frontiers*, *15*(4), Article 101669. https://doi.org/10.1016/j.gsf.2023.101669

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Arora, N., Dhiman, N., & Shrivastava, R. (2023). How green entrepreneurship evolved over the past two decades? A glance through bibliometric analysis. *Vision: The Journal of Business Perspective*. Advance online publication. https://doi.org/10.1177/09722629231217593

Arsawan, I. W. E., Kartikasari, A., Suhartanto, D., & Choirisa, S. F. (2026). Transitioning towards circular economy practices: The role of organizational capabilities and environmental dynamism—Evidence from Indonesia. *Business Strategy and the Environment*, *35*(1), 18–35.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, *65*, 42–56. https://doi.org/10.1016/j.jclepro.2013.11.039

Cantú, A., Aguiñaga, E., & Scheel, C. (2021). Learning from failure and success: The challenges for circular economy implementation in SMEs in an emerging economy. *Sustainability*, *13*(3), Article 1529. https://doi.org/10.3390/su13031529

Confederation of Indian Industry. (2024, January 20). Green entrepreneurship in India. *CII Blog*. https://ciiblog.in/green-entrepreneurship-in-india/

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*, 147–160. https://doi.org/10.2307/2095101

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a systematic analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Doran, J., McCarthy, N., O'Connor, M., & Nsiah, C. (2023). Environmental regulation and SMEs: Evidence from a microdata analysis. *Journal of Environmental Planning and Management*, *66*(8), 1729–1756. https://doi.org/10.1080/09640568.2022.2046705

Ellili, N. (2024). Systematic analysis of sustainability papers: Evidence from Environment, Development and Sustainability. *Environment, Development and Sustainability*, *26*, 8183–8209. https://doi.org/10.1007/s10668-023-03067-6

Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and systematic analysis. *International Journal of Production Economics*, *162*, 101–114. https://doi.org/10.1016/j.ijpe.2015.01.003

Ferreira, J. J., Fernandes, C., & Ratten, V. (2023). Green innovation in small and medium-sized enterprises (SMEs): A qualitative approach. *Sustainability*, *15*(5), Article 4510. https://doi.org/10.3390/su15054510

Fortune Business Insights. (2024). Green technology and sustainability market size, share & industry analysis, by component (solutions and services), by deployment (cloud and on-premise), by enterprise type (large enterprise and SMEs), by implemented technology, by application, and regional forecast, 2024–2032 (Report No. FBI102221). https://www.fortunebusinessinsights.com/green-technology-and-sustainability-market-102221

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

Gupta, M., & Dharwal, M. (2022). Green entrepreneurship and sustainable development: A conceptual framework. *Materials Today: Proceedings, 49*, 3603–3606. https://doi.org/10.1016/j.matpr.2021.08.148

Hart, S. L. (1995). A natural-resource-based view of the firm. *The Academy of Management Review, 20*(4), 986–1014. https://doi.org/10.2307/258963

Jennifer, L. (2024, March 12). IEA reveals global CO2 emissions reach record high in 2023, but growth slows. *Carbon Credits*. https://carboncredits.com/iea-reveals-global-carbon-emissions-reach-record-high-in-2023

Jiang, L., Cao, X., Wang, Z., Zhan, Y., Zhang, J., & Chen, S. (2025). Promoting energy saving and emission reduction benefits in small and medium-sized enterprises supply chains through green finance: Evidence based on artificial intelligence intervention. *International Review of Financial Analysis, 102*(C).

Jones, G. (2017). *Profits and sustainability: A history of green entrepreneurship*. Oxford University Press.

Kamal, L. N., & Jasni, N. S. (2023). A thematic review on circular economy practices among SMEs. *European Proceedings of Social and Behavioural Sciences, 131*, 1096–1110. https://doi.org/10.15405/epsbs.2023.11.89

Kannan, S., & Gambetta, N. (2025). Technology-driven sustainability in small and medium-sized enterprises: A systematic literature review. *Journal of Small Business Strategy, 35*(1), Article 126636. https://doi.org/10.53703/001c.126636

Kirby, A. (2023). Exploratory systematics: Using VOSviewer as a preliminary research tool. *Publications, 11*(1), Article 10. https://doi.org/10.3390/publications11010010

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling, 127*, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Kirkwood, J., & Walton, S. (2010). What motivates ecopreneurs to start businesses? *International Journal of Entrepreneurial Behaviour & Research, 16*(3), 204–228. https://doi.org/10.1108/13552551011042799

Li, Y., & Huang, Y. (2023). Enhancing resources efficiency: Studying economic development in resource-rich regions for long-term sustainability of China. *Resources Policy, 86*(PA). https://doi.org/

Liu, Y., Kumar, S., Liu, H., Li, S., & Zhou, Z. (2025). ESG performance, digital transformation, and green innovation. *Humanities and Social Sciences Communications, 12*, 1739. https://doi.org/10.1057/s41599-025-06027-9

Maesaroh, S. S., Rahayu, A., Ahman, E., Wibowo, L. A., & Swardana, A. (2024). Green economy research trends and mapping in SMEs: A systematic analysis. *International Journal of Sustainable Development and Planning, 19*(3), 1089–1099. https://doi.org/10.18280/ijsdp.190318

Magableh, I. K., Mohammad, S., & Al-Zaqeba, M. A. (2025). Digital marketing and sustainable innovation in SMEs through systematic review. *Cogent Business & Management, 12*(1), Article 2548953. https://doi.org/10.1080/23311975.2025.2548953

Martínez-Peláez, R., Ochoa-Brust, A., Rivera, S., & Mena, L. J. (2024). Sustainable digital transformation roadmaps for SMEs: A systematic literature review. *Sustainability, 16*(19), Article 8551. https://doi.org/10.3390/su16198551

Mishra, S., Sahoo, D., & Mohapatra, S. (2024). Circular economy adoption in MSMEs: Unveiling enablers and barriers. *International Journal of Development Issues, 24*(2), 237–263. https://doi.org/10.1108/IJDI-06-2024-0163

Odeyemi, O., Usman, F. O., Mhlongo, N. Z., Elufioye, O. A., & Ike, C. U. (2024). Sustainable entrepreneurship: A review of green business practices and environmental impact. *World Journal of Advanced Research and Reviews, 21*(2), 346–358. https://doi.org/10.30574/wjarr.2024.21.2.0461

Olekanma, O., Nwafor, C. E., & Anosike, P. (2024). Small- and medium-sized enterprises' carbon footprint reduction initiatives as a catalyst for green jobs. *Business Strategy and the Environment, 33*(6), 5289–5318. https://doi.org/10.1002/bse.3846

Page, M. J., McKenzie, J. E., Bossuyt, P. M., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Systematic Reviews, 10*(1), Article 89. https://doi.org/10.1186/s13643-021-01626-4

Sabando-Vera, D., Montalvan-Burbano, N., Parrales-Guerrero, K., Yonfá Medranda, M., & Plaza-Úbeda, J. (2025). Growing a greener future: A bibliometric analysis of green innovation in SMEs. *Technological Forecasting and Social Change, 212*, 123976. https://doi.org/10.1016/j.techfore.2025.123976

Schmiedeknecht, M. (2020). Social innovation and entrepreneurship supporting the sustainable development goals (SDGs): Fostering social value creation. In *The future of the UN sustainable development goals* (pp. 211–225). Springer.

Scott, W. R. (2014). *Institutions and organizations: Ideas, interests, and identities*. Sage Publications. https://doi.org/10.3917/mana.172.0136

Sikandar, H., Abdul Kohar, U. H., Sanda, G., Salman, A., Cilan, T., Shabbir, M., & Ramos Meza, C. (2023). Eco-innovation in small and medium enterprises (SMEs): A systematic literature review. *Journal of the Knowledge Economy, 15*, 1–23.

Singh, S., & Mondal, S. (2025). A bibliometric and thematic analysis of green entrepreneurship in business research: Current status and future research directions. *Environment, Development and Sustainability, 27*(1), 67–139. https://doi.org/10.1007/s10668-023-03905-7

Song, C., Teh, S., Alnoor, A., et al. (2025). Trends of the digital transformation and green innovation using PRISMA and bibliometric analysis review. *Discover Sustainability, 6*, 1010. https://doi.org/10.1007/s43621-025-01855-w

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. http://www.jstor.org/stable/20141992

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

United Nations Economic Commission for Europe. (2024). Harnessing opportunities from the circular and green economy: A compendium of guidance resources for MSMEs. https://unece.org/sites/default/files/2024-01/MSME-Compendium-2024.pdf

Valache-Dărîngă, A.-A., Ciurea, M., & Popescu, M. (2025). A bibliometric perspective of the green transition within the framework of sustainable development. *World, 6*(4), 1–25.

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Wang, S., & Zhang, H. (2025). Enhancing SMEs sustainable innovation and performance through digital transformation. *Socio-Economic Planning Sciences, 98*(C), Article 102124.

York, J. G., & Venkataraman, S. (2010). The entrepreneur–environment nexus: Uncertainty, innovation, and allocation. *Journal of Business Venturing, 25*(5), 449–463. https://doi.org/10.1016/j.jbusvent.2009.07.007

Zhang, J., Quoquab, F., & Mohammad, J. (2024). Plastic and sustainability: A systematic analysis using VOSviewer and CiteSpace. *Arab Gulf Journal of Scientific Research, 42*(1), 44–67. https://doi.org/10.1108/AGJSR-10-2022-0225