

Mapping Sustainable Business Research from 2015 to 2025 Using Bibliometric Analysis

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Abstract: This study provides a bibliometric overview of sustainable business research published between 2015 and 2025. Bibliographic data were retrieved from the Web of Science Core Collection and included English-language articles and review articles. Following data screening and cleaning, 4,317 publications were retained for analysis. Performance indicators were combined with science mapping techniques using VOSviewer to examine publication growth, influential contributors, international collaboration, thematic structure, and emerging research topics. Scientific production increased continuously from 128 publications in 2015 to 831 publications in 2025, with nearly seventy percent of the documents published during the final five years of the period. China recorded the largest publication output, while England displayed the strongest overall international collaboration. The country co-authorship network included 51 countries organized into five clusters. Keyword co-occurrence analysis identified 260 terms grouped into five interconnected thematic clusters addressing organizational performance, corporate responsibility and governance, technological transformation, sustainable business model innovation, and organizational capabilities. The temporal analysis revealed growing attention to environmental, social, and governance practices, disclosure, digital transformation, dynamic capabilities, and small and medium-sized enterprises. The findings demonstrate that sustainable business has developed into a rapidly expanding and internationally connected research field that increasingly integrates strategic, technological, environmental, and organizational perspectives.

Keywords: Sustainable Business; Business Sustainability; Sustainable Business Model; Bibliometric Analysis; VOSviewer.

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I. INTRODUCTION

Sustainability has become an increasingly important concern for businesses, governments, and society. Companies are expected not only to remain economically viable, but also to respond to environmental degradation, resource constraints, climate-related risks, and growing social expectations. This shift was reinforced by the adoption of the United Nations 2030 Agenda in 2015, which established 17 Sustainable Development Goals and called for coordinated action by governments, organizations, and other societal actors [1]. Businesses occupy an important position in this agenda because their investment decisions, production systems, supply chains, technologies, and relationships with stakeholders can either support or hinder progress toward sustainable development.

Within this context, sustainable business refers to the integration of economic viability with environmental responsibility and social value creation. This perspective extends beyond regulatory compliance or isolated corporate responsibility initiatives. It requires sustainability considerations to be incorporated into organizational strategy, decision-making, operations, and value creation processes.

Sustainable business models have therefore attracted particular attention because they describe how firms can create, deliver, and capture value while considering the interests of a wider range of stakeholders and reducing negative environmental and social effects [2], [3].

Research in this area has expanded beyond the initial discussion of corporate sustainability. Sustainable business is now examined in relation to innovation, circular economy, entrepreneurship, corporate social responsibility, governance, firm performance, supply chains, and technological transformation. Studies of sustainable business model innovation have also shown that the transition toward sustainability may require substantial changes in value propositions, organizational processes, stakeholder relationships, and revenue mechanisms rather than minor improvements to existing practices [4]. At the same time, the diversity of approaches has produced a broad and partly fragmented body of knowledge in which overlapping concepts and alternative terms are frequently used.

The development of this literature has generated a need for methods capable of examining a large number of publications and identifying patterns that may not be visible

through a conventional narrative review. Previous bibliometric studies have made important contributions by mapping sustainable business models, green business models, and sustainable business model innovation [5]–[7]. However, these studies have generally focused on a particular component of the field, especially business model innovation, or have examined datasets that ended before the most recent expansion of research concerning environmental, social, and governance practices, digital transformation, and organizational capabilities. This suggests that a broader and updated analysis of sustainable business research may provide additional insight into the development and current structure of the field. This assessment is an inference based on the comparatively narrower scope and earlier coverage periods of the existing bibliometric studies.

Accordingly, this study examines sustainable business research published between 2015 and 2025 and indexed in the Web of Science Core Collection. The analysis addresses four research questions:

- RQ1: How has scientific production on sustainable business evolved between 2015 and 2025?
- RQ2: Which authors, sources, institutions, countries, and publications have contributed most significantly to sustainable business research?
- RQ3: What collaboration patterns characterize sustainable business research at the country level?
- RQ4: What major thematic clusters and emerging topics can be identified in sustainable business research?

The study contributes to the literature in three main respects. First, it provides an updated account of publication activity during the decade following the adoption of the 2030 Agenda. Second, it combines performance analysis with bibliometric science mapping to examine productivity, influence, collaboration, and thematic relationships within a dataset of 4,317 publications. Third, it identifies the conceptual structure and temporal development of sustainable business research, including the relationship between established themes and more recent topics. By adopting a broad search strategy, the study captures not only research explicitly focused on sustainable business models, but also work concerning business sustainability and sustainable business more generally.

The remainder of the article is organized as follows. Section II reviews the conceptual foundations of sustainable business and summarizes relevant review and bibliometric studies. Section III explains the database, search strategy, selection criteria, data-cleaning process, and bibliometric methods. Section IV presents the descriptive and network-analysis results. Section V discusses the findings and their implications, while Section VI summarizes the conclusions, limitations, and future research directions.

II. LITERATURE REVIEW

Sustainable business reflects the integration of economic performance with environmental responsibility and social value creation. Rather than treating sustainability as a separate

corporate activity, this perspective requires environmental and social considerations to be incorporated into organizational strategy, operations, and stakeholder relationships. Closely related concepts, including business sustainability, corporate sustainability, and responsible business, are often used with overlapping meanings, which has contributed to conceptual diversity within the field.

The sustainable business model has become one of the central concepts in this literature. A business model generally explains how an organization creates, delivers, and captures value. From a sustainability perspective, this logic is expanded to include environmental and social value and the interests of stakeholders beyond customers and shareholders. Schaltegger, Hansen, and Lüdeke-Freund emphasized the role of business models in translating sustainability principles into organizational value creation, while Bocken et al. identified recurring archetypes such as resource efficiency, value creation from waste, service-based solutions, and socially oriented business models [2], [3]. Sustainable business model innovation may therefore involve changes in value propositions, operational processes, partnerships, and revenue mechanisms rather than isolated improvements to existing activities [4].

The field has gradually expanded to include several related research streams. Corporate social responsibility and environmental, social, and governance practices address organizational accountability, disclosure, stakeholder expectations, and firm performance. Circular economy research focuses on reducing resource use and waste through reuse, recovery, product-life extension, and closed-loop systems. More recently, digital transformation, artificial intelligence, blockchain, and Industry 4.0 have been examined as potential enablers of sustainable operations and business model innovation. However, the sustainability effects of these technologies depend on how they are implemented and integrated into organizational decision-making.

The growing diversity of topics has encouraged the use of bibliometric methods to examine the structure of the literature. Previous studies have mapped sustainable business models, green business models, and sustainable business model innovation. Marczewska and Kostrzewski identified entrepreneurship, value creation, circular economy, innovation, and corporate sustainability as important research areas [5]. Pan, Xu, and Skare examined the development of sustainable business model innovation, while Najmaei and Sadeghinejad analyzed the historical evolution and conceptual structure of green and sustainable business models [6], [7]. These studies demonstrate the rapid development of the field, but they mainly focus on specific dimensions of sustainable business models.

The present study adopts a broader scope by examining publications associated with sustainable business, business sustainability, and sustainable business models. It covers the period from 2015 to 2025 and combines performance analysis with science mapping. This approach makes it possible to identify publication trends, influential contributors, international collaboration patterns, major thematic clusters,

and emerging research topics within the wider sustainable business literature.

III. MATERIALS AND METHODS

➤ Research Design

This study adopted a quantitative bibliometric design to examine the development and structure of sustainable business research. Bibliometric analysis was selected because it enables the systematic evaluation of a large body of scientific publications through indicators of productivity, citation impact, collaboration, and conceptual relationships. The research design combined performance analysis with science mapping. Performance analysis was used to identify the main contributors and publication trends, while science mapping was employed to examine the relationships among countries and research topics [8], [9].

➤ Data Source and Search Strategy

The bibliographic data were retrieved from the Web of Science Core Collection on August 5, 2026. The database was selected because it provides standardized information on publications, authors, affiliations, countries, citations, keywords, and cited references.

The search was performed in the Topic field using the following query: TS=("sustainable business" OR "business sustainability" OR "sustainable business model" OR "sustainable business models"). In Web of Science, the Topic field searches the title, abstract, author keywords, and Keywords Plus fields.

The initial search returned 6,743 records. The results were subsequently limited to publications issued between 2015 and 2025, written in English, and classified by Web of Science as articles or review articles. After applying these criteria, 4,502 records remained.

➤ Data Export and Screening

The records were exported in plain-text format using the Full Record and Cited References option. Because Web of Science permitted a maximum of 500 records in each export operation, the publications were downloaded in ten consecutive batches.

The exported files were merged and checked using a custom Python procedure. The Web of Science accession number, represented by the UT field, was used as the primary identifier for detecting duplicate records. No duplicate accession numbers were identified.

During metadata validation, 164 records with a final publication year of 2026 were found in the exported dataset. These records were excluded to maintain strict consistency with the selected 2015–2025 period. A further 21 records identified as retracted publications were removed. The final dataset therefore contained 4,317 publications.

➤ Data Standardization

Keyword standardization was performed before constructing the thematic network. A VOSviewer thesaurus file

containing 48 replacement and exclusion rules was developed to reduce inconsistencies caused by spelling variations, singular and plural forms, abbreviations, hyphenated expressions, and semantically equivalent terms.

For example, the plural expression sustainable business models was standardized as sustainable business model. The abbreviation CSR and related spelling variants were consolidated under corporate social responsibility. Clearly malformed or non-informative keyword expressions were excluded when they did not provide meaningful thematic information. This procedure reduced the effect of terminological fragmentation and prevented conceptually identical terms from being represented as separate nodes.

➤ Bibliometric Indicators

The performance analysis was designed to examine the following dimensions:

- Annual scientific production;
- Most productive authors;
- Most relevant publication sources;
- Leading institutions;
- Most productive countries;
- Most cited publications;
- Citation influence of the main contributors.

Publication counts were used as indicators of productivity, whereas citation counts were used to assess scientific influence. Because older publications have had more time to accumulate citations, citation results will be interpreted together with publication year rather than being treated as direct measures of research quality.

➤ Science Mapping and Network Analysis

Science mapping was conducted using VOSviewer version 1.6.21. The software is designed for constructing and visualizing bibliometric networks, including relationships among authors, countries, publications, sources, and keywords [10].

Keyword co-occurrence analysis was performed using all keywords, which included both author keywords and Keywords Plus. The full counting method was selected, meaning that each keyword occurrence and each co-occurrence relationship received full weight.

A minimum threshold of 20 occurrences was applied. In the initial analysis, 293 keywords met this threshold and were organized into six clusters. Following thesaurus-based standardization, the final map contained 260 keywords grouped into five clusters.

Three forms of visualization were generated:

- Network visualization, used to identify thematic clusters and relationships among keywords;
- Overlay visualization, used to examine the average publication year of the keywords and identify more recent research topics;

- Density visualization, used to reveal the areas with the highest concentration of frequently occurring and strongly connected keywords.

In the network visualization, the size of a node reflects the number of occurrences of a keyword. Links represent co-occurrence relationships, while the distance between nodes indicates their relatedness. The cluster colors represent groups of keywords with stronger internal relationships [10], [11].

➤ Country Co-authorship Analysis

A country-level co-authorship analysis was conducted to examine international research collaboration. Full counting was applied, and a minimum threshold of 30 publications per country was established, without imposing a minimum citation threshold. Documents co-authored by more than 25 countries were excluded to reduce the influence of unusually large international consortia. Of the 132 countries identified in the dataset, 51 met the selection threshold. The resulting network comprised five clusters, 692 links, and a total link strength of 2,731. In the visualization, node size represents the number of publications associated with a country, while links indicate co-authorship relationships and total link strength reflects the overall intensity of international collaboration.

IV. RESULTS

➤ Annual Scientific Production

The annual distribution of publications shows a clear and sustained expansion of sustainable business research between

2015 and 2025. As illustrated in Fig. 1, scientific production increased from 128 publications in 2015 to 831 publications in 2025. This represents an overall increase of approximately 549.2% and a compound annual growth rate of approximately 20.6% over the analyzed period.

The development of the literature was not uniform across the entire decade. Publication output remained relatively stable between 2015 and 2016, increasing only from 128 to 131 documents. A stronger upward trend became visible from 2017 onward, with the number of publications reaching 249 in 2018, 351 in 2020, and 442 in 2021. Growth slowed temporarily in 2022, when 471 publications were recorded, but accelerated again during the final three years of the period. The annual output rose to 576 publications in 2023, 689 in 2024, and 831 in 2025.

Publications issued between 2021 and 2025 accounted for approximately 69.7% of the final dataset. This concentration indicates that academic interest in sustainable business intensified considerably during the most recent part of the analyzed decade. The absence of any year-to-year decline further suggests that sustainable business, business sustainability, and sustainable business models have developed into increasingly prominent areas of research. These findings answer RQ1 by demonstrating a continuous and accelerating growth in scientific production between 2015 and 2025.

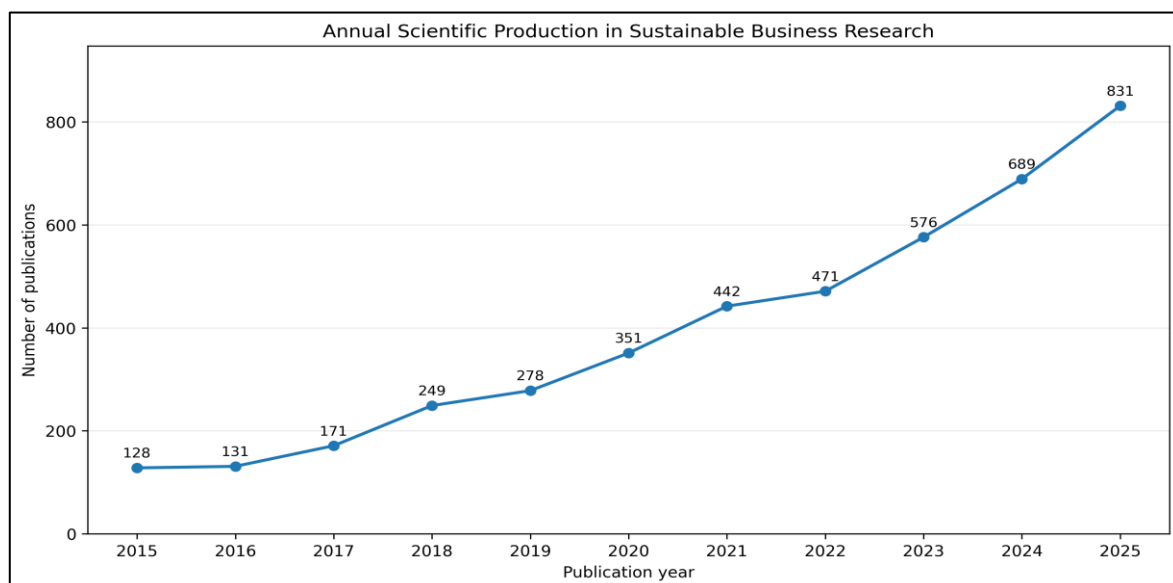


Fig 1 Annual Scientific Production in Sustainable Business Research from 2015 to 2025.

➤ Country Productivity and International Research Collaboration

The country-level analysis identified 132 countries contributing to sustainable business research. After applying a minimum threshold of 30 publications per country, 51 countries were retained in the final co-authorship network. The resulting network comprised five clusters, 692 links, and a total link strength of 2,731.

China recorded the highest publication output, with 477 documents, followed by the United States with 359, England with 355, India with 339, and Italy with 309. Malaysia, Spain, Australia, Germany, and Indonesia also ranked among the ten most productive countries. The geographical distribution of these contributors indicates that sustainable business research is not concentrated within a single region, but involves established and emerging research systems from Europe, Asia, North America, and Oceania.

Table 1 Leading Countries by Number of Publications

Rank	Country performance indicators					
	Country	Documents	Citations	Links	TLS	Cluster
1	China	477	11,343	46	383	3
2	United States	359	12,869	45	326	1
3	England	355	20,720	45	400	1
4	India	339	8,075	40	208	2
5	Italy	309	10,892	44	224	4
6	Malaysia	260	8,188	40	279	3
7	Spain	246	6,731	38	188	1
8	Australia	214	8,640	44	250	3
9	Germany	207	7,350	40	183	1
10	Indonesia	190	2,713	28	79	3

- Note: TLS denotes total link strength. The ranking is based on the number of publications. Data were retrieved from the Web of Science Core Collection and processed using VOSviewer.

Publication output, citation influence, and collaboration intensity produced different country rankings. England had the highest total link strength, with a value of 400, followed by China with 383 and the United States with 326. Malaysia and Australia also displayed strong international collaboration, with total link strength values of 279 and 250, respectively. China maintained links with 46 countries, while England and the United States were each connected to 45 countries.

England received the largest number of citations, with 20,720, followed by the United States with 12,869, China with 11,343, Italy with 10,892, and the Netherlands with 10,079. The Netherlands was not among the five most productive countries but occupied a prominent position in terms of citations. This difference shows that publication volume, collaboration strength, and accumulated citation impact represent distinct dimensions of national research performance.

As illustrated in Fig. 2, the country network was highly interconnected, with numerous links extending across the five clusters. The colors represent collaboration communities identified by the VOSviewer clustering algorithm rather than strictly defined geographical regions. The presence of extensive connections across cluster boundaries confirms the international character of sustainable business research.

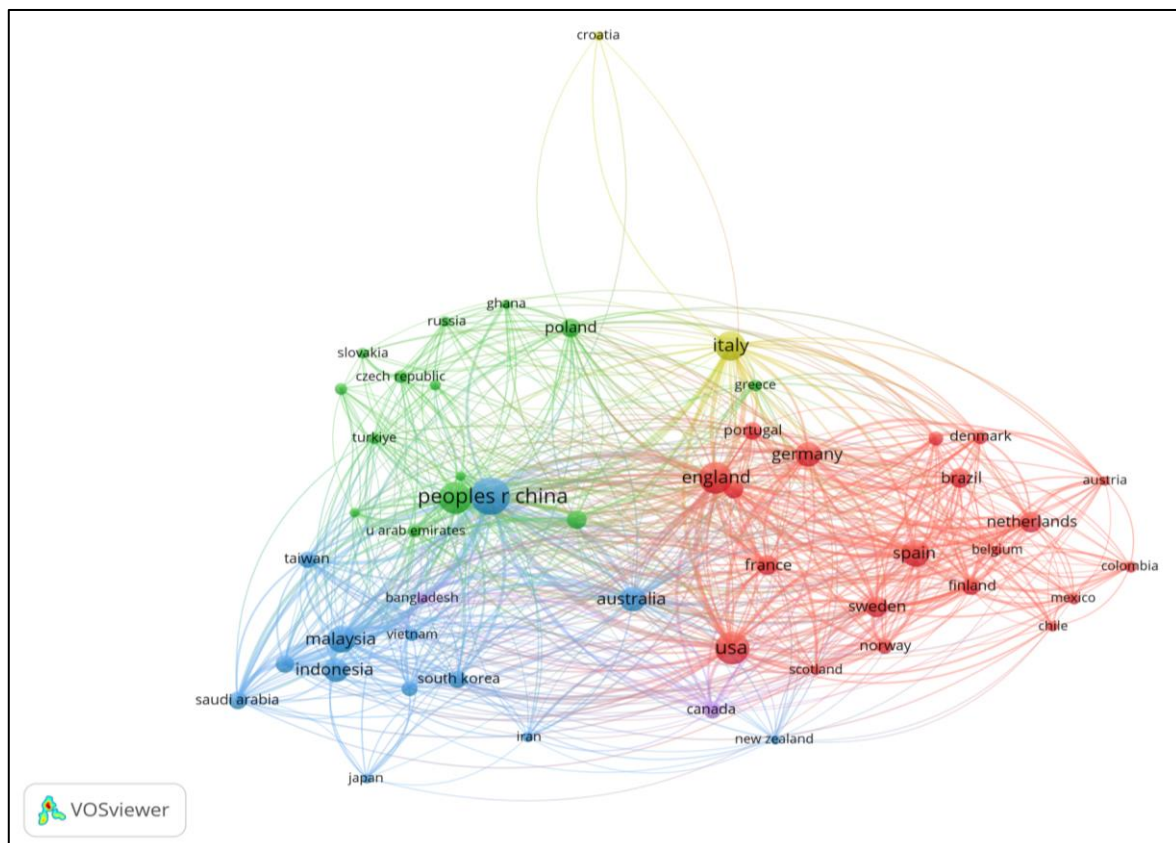


Fig 2 Country Co-Authorship Network in Sustainable Business Research. Node Size Represents Publication Output, Colors Indicate Collaboration Clusters, and Links Represent Co-Authorship Relationships Between Countries.

The bilateral relationships provide a more detailed view of the collaboration structure. The strongest co-authorship connection was identified between Pakistan and China, with a link strength of 46, followed by China and the United States, with a value of 43. England maintained particularly strong relationships with Italy, China, France, the United States, India, and Australia. Strong links were also observed between Indonesia and Malaysia, Malaysia and China, Malaysia and Pakistan, and Pakistan and Saudi Arabia.

These patterns suggest that the international structure of the field combines established global partnerships with increasingly active regional networks. England appears to occupy an important connecting position across several research communities, while the strong relationships among China, Pakistan, Malaysia, Indonesia, and Saudi Arabia demonstrate the growing contribution of Asian collaboration networks.

Table 2 Strongest Country Co-Authorship Relationships

Rank	Co-authorship relationship indicators		
	Country 1	Country 2	Link strength
1	Pakistan	China	46
2	China	United States	43
3	England	Italy	31
4	England	China	30
5	England	France	30
6	England	United States	29
7	Indonesia	Malaysia	29
8	Australia	England	27
9	England	India	26
10	Malaysia	China	26
11	Malaysia	Pakistan	26

- Note: Link strength indicates the intensity of co-authorship collaboration between the two countries.

➤ Leading Publication Sources

The 4,317 publications included in the final dataset were distributed across 1,298 publication sources, demonstrating that sustainable business research is disseminated through a wide range of journals in management, sustainability, environmental science, and related fields. Despite this diversity, a comparatively small group of journals accounted for a substantial proportion of the total scientific output.

Sustainability was the most productive source, with 734 publications, representing approximately 17.0% of the entire dataset. It was followed by the Journal of Cleaner Production, with 248 publications, and Business Strategy and the Environment, with 133 publications. Other prominent sources

included Corporate Social Responsibility and Environmental Management, Cogent Business and Management, and the Journal of Business Research. Together, the ten most productive sources published 1,382 documents, corresponding to approximately 32.0% of the analyzed literature.

Publication output and citation influence produced different source rankings. The Journal of Cleaner Production accumulated the highest number of citations, with 23,580, despite publishing considerably fewer documents than Sustainability, which received 16,274 citations. Business Strategy and the Environment ranked third in both publication output and total citations, with 7,182 citations. The Journal of Business Research also demonstrated substantial citation influence, receiving 2,605 citations from 33 publications. These findings show that publication volume does not necessarily correspond to the average scientific influence of a journal.

Table 3 Leading Publication Sources in Sustainable Business Research

Rank	Source performance indicators			
	Publication source	Documents	Citations	Avg. citations
1	Sustainability	734	16,274	22.2
2	Journal of Cleaner Production	248	23,580	95.1
3	Business Strategy and the Environment	133	7,182	54.0
4	Corporate Social Responsibility and Environmental Management	59	2,357	39.9
5	Cogent Business and Management	56	505	9.0
6	Journal of Business Research	33	2,605	78.9
7	Sustainable Production and Consumption	31	1,406	45.4
8	Energies	31	535	17.3
9	Discover Sustainability	30	196	6.5
10	Sustainable Development	27	642	23.8

- Note: Sources are ranked by publication count. Average citations were calculated as citations per document. Citation data reflect the Web of Science records retrieved on August 5, 2026.

Overall, the source analysis reveals a combination of publication concentration and disciplinary diversity. While Sustainability accounted for the largest share of documents, journals such as the Journal of Cleaner Production, the Journal of Business Research, and Business Strategy and the Environment displayed higher average citation rates. This distinction suggests that publication productivity and citation influence represent complementary dimensions of source relevance.

➤ *Leading Authors and Institutions*

Author productivity was comparatively dispersed, although several researchers developed sustained publication

records in the field. After consolidating clear variants of the same author name, Nancy M. P. Bocken was the most productive author, with 38 publications and 4,624 citations. She was followed by Goran Svensson, with 28 publications, and Zabihollah Rezaee, with 19 publications. Sachin Kumar Mangla and Steve Evans also occupied prominent positions. Evans recorded a particularly high citation influence, accumulating 3,252 citations from 11 publications.

At the institutional level, the Bucharest University of Economic Studies recorded the highest output among specific academic institutions, with 45 publications. Universiti Sains Malaysia followed with 39 publications, while Lund University contributed 38. Delft University of Technology and Lappeenranta-Lahti University of Technology LUT also ranked among the leading institutions. Although Delft University of Technology published fewer documents than the first three institutions, it accumulated the highest number of citations within this group.

Table 4 Leading Authors and Academic Institutions

Rank	Leading authors			Leading academic institutions		
	Author	Documents	Citations	Academic institution	Documents	Citations
1	Nancy M. P. Bocken	38	4,624	Bucharest University of Economic Studies	45	782
2	Goran Svensson	28	1,004	Universiti Sains Malaysia	39	1,860
3	Zabihollah Rezaee	19	829	Lund University	38	3,382
4	Sachin Kumar Mangla	12	967	Delft University of Technology	32	3,598
5	Steve Evans	11	3,252	Lappeenranta-Lahti University of Technology LUT	31	1,892

- Note: Authors are ranked by publication count, with citations used to resolve ties. Clear variants of the same author name were consolidated. The institutional ranking includes specific academic institutions; umbrella university systems and government bodies were excluded to improve interpretability. Citation data reflect the Web of Science records retrieved on August 5, 2026.

The results indicate that productivity and citation influence were not always aligned. Bocken led the field by publication volume, whereas Evans achieved the highest average citation impact among the five authors. A similar pattern was observed among institutions: Bucharest University of Economic Studies produced the largest number of publications, while Delft University of Technology and Lund University accumulated substantially more citations. These differences reinforce the need to distinguish scientific productivity from citation-based influence.

➤ *Most Cited Publications*

Citation analysis was used to identify the publications that exerted the greatest influence within the analyzed dataset. The most cited document was the study by Murray et al. [12] on the conceptual foundations and global applications of the circular economy, which accumulated 1,877 citations. It was followed by Lewandowski's conceptual framework for circular economy business models [13], with 985 citations, and the review of sustainable business model innovation by Geissdoerfer et al. [4], with 947 citations. The ranking also included research on organizational resilience through sustainable business practices [14] and the relationship between circular business models and supply chains [15]. The five most cited publications were issued between 2016 and 2018 and addressed circular economy, sustainable business models, organizational resilience, and supply-chain transformation. Their concentration in the earlier part of the study period is partly explained by the longer time available for citation accumulation. Nevertheless, their continued prominence indicates that they provided important conceptual foundations for subsequent sustainable business research.

Table 5 Most Cited Publications in Sustainable Business Research

Rank	Publication impact indicators			
	Publication	Source	Year	Citations
1	Murray et al., “The circular economy: An interdisciplinary exploration of the concept and application in a global context”	Journal of Business Ethics	2017	1,877
2	Lewandowski, “Designing the business models for circular economy: Towards the conceptual framework”	Sustainability	2016	985
3	Geissdoerfer et al., “Sustainable business model innovation: A review”	Journal of Cleaner Production	2018	947
4	Ortiz-de-Mandojana and Bansal, “The long-term benefits of organizational resilience through sustainable business practices”	Strategic Management Journal	2016	871
5	Geissdoerfer et al., “Business models and supply chains for the circular economy”	Journal of Cleaner Production	2018	847

- Note: Publications are ranked by total citations. Citation counts reflect the Web of Science records retrieved on August 5, 2026, and may change over time.

Overall, the citation ranking highlights the central role of circular economy and business model research in the intellectual development of the field. Four of the five leading publications explicitly examined business models, circularity, or their interaction, while the remaining study connected sustainable practices with long-term organizational resilience. These works therefore represent important foundations for the thematic structure identified through the keyword analysis.

➤ *Keyword Co-Occurrence and Thematic Structure*

Keyword co-occurrence analysis was used to examine the conceptual structure of sustainable business research. After thesaurus-based standardization, 260 keywords met the

minimum threshold of 20 occurrences. The final network comprised five clusters, 15,939 links, and a total link strength of 65,989. As shown in Fig. 3, the network is highly interconnected, indicating that the principal research themes have developed through substantial conceptual overlap rather than as isolated areas of inquiry.

The most prominent and centrally positioned terms included “sustainability,” “performance,” “management perspective,” “business sustainability,” “sustainable business model,” “corporate social responsibility,” and “sustainable development.” Their central positions and numerous connections suggest that the field combines strategic, organizational, environmental, and performance-oriented perspectives. The proximity among these terms also indicates that sustainable business research frequently links value creation and organizational performance with broader environmental and social objectives.

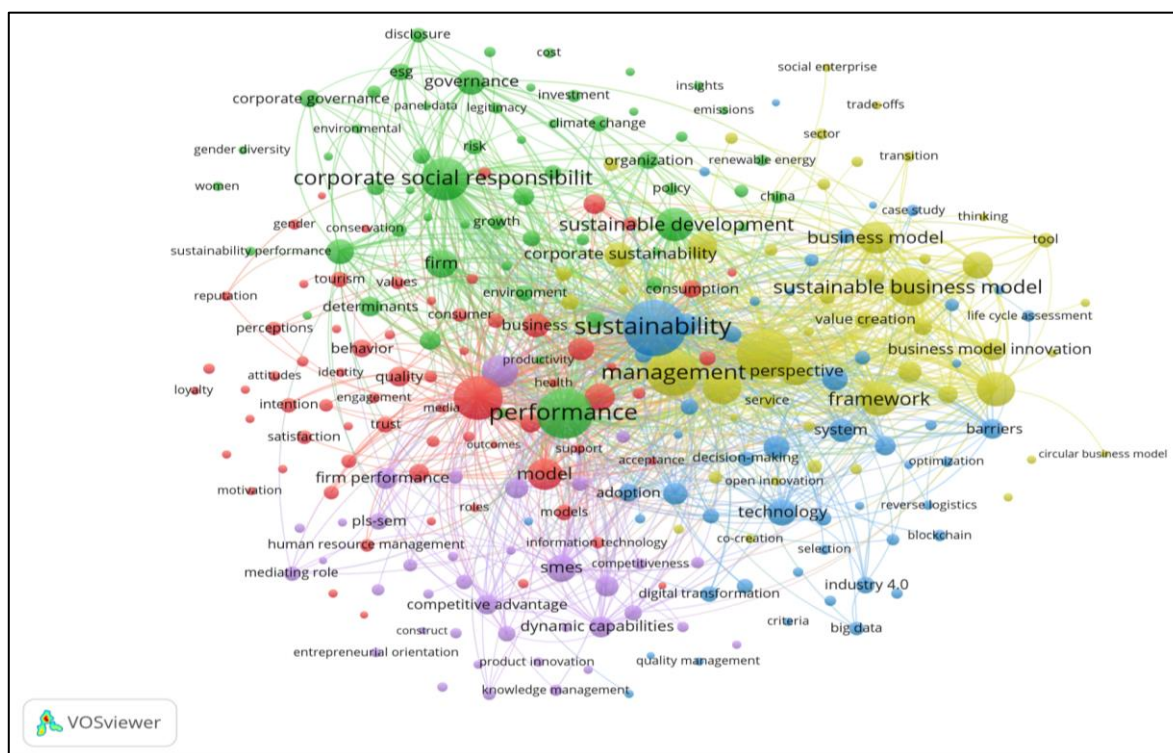


Fig 3 Keyword Co-Occurrence Network in Sustainable Business Research. Node Size Represents Keyword Occurrence Frequency, Links Indicate Co-Occurrence Relationships, and Colors Identify Thematic Clusters.

Based on the dominant terms visible within each group, the five clusters can be interpreted as follows. The first cluster centers on organizational and market performance, including terms such as performance, firm performance, quality, behavior, trust, satisfaction, and intention. The second cluster reflects corporate sustainability and governance, bringing together corporate social responsibility, sustainable development, corporate sustainability, governance, environmental issues, and financial performance. The third cluster concerns management systems and technological transformation, including business sustainability, technology, adoption, information technology, digital transformation, Industry 4.0, blockchain, and big data.

The fourth cluster is primarily associated with sustainable business models and value creation. Its principal terms include sustainable business model, business model, business model innovation, framework, value creation, barriers, and circular business model. The fifth cluster focuses on organizational capabilities and smaller firms, connecting SMEs, dynamic capabilities, competitive advantage, human resource management, product innovation, knowledge management, and mediating role. These cluster labels are interpretive and summarize the dominant conceptual orientation of each group rather than representing categories assigned directly by VOSviewer.

Overall, the network reveals that sustainable business research is structured around five complementary dimensions: organizational performance, corporate responsibility and governance, technology-enabled management, sustainable business model innovation, and organizational capabilities. The strong connections among the clusters demonstrate that these dimensions are closely related and collectively shape the intellectual structure of the field.

➤ Temporal Evolution of Research Topics

The overlay visualization was used to examine the temporal development of the keyword network. In Fig. 4, colors represent the average publication year of the documents associated with each keyword, ranging approximately from 2021.0 for the cooler colors to 2022.5 for the warmer colors. This interval does not represent the full publication period, but the average year calculated by VOSviewer for each term.

Keywords positioned toward the cooler end of the scale included “sustainable business model,” “business model,” “social enterprise,” “trade-offs,” “case study,” and “optimization.” These terms represent comparatively earlier areas within the analyzed network. By contrast, warmer colors were associated with terms such as “ESG,” “disclosure,” “dynamic capabilities,” “digital transformation,” “SMEs,” “PLS-SEM,” and “intention,” indicating stronger representation in more recent publications.

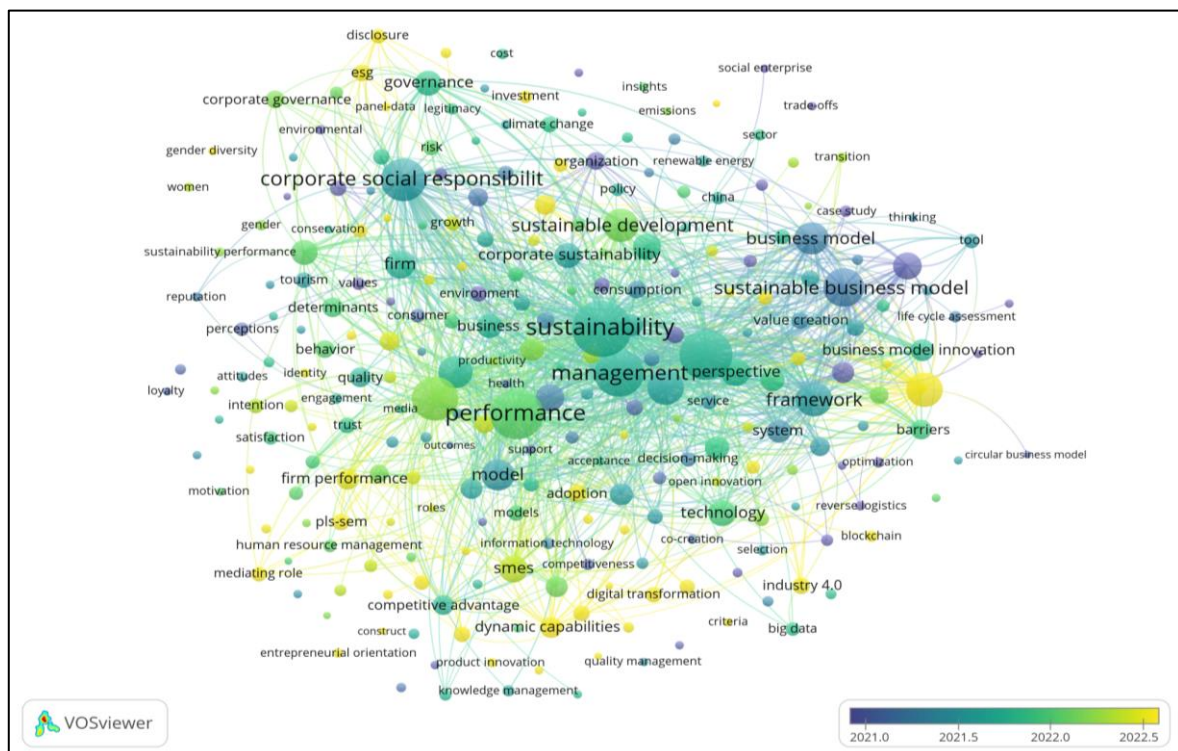


Fig 4 Overlay Visualization of Keyword Co-Occurrence Based on Average Publication Year.

The temporal pattern suggests a gradual movement from the conceptual development and design of sustainable business models toward more empirically oriented research on governance, organizational capabilities, digital transformation, and firm-level decision-making. The recent visibility of ESG and disclosure also reflects growing attention to accountability

and sustainability reporting. At the same time, the continued centrality of sustainable business models, performance, and corporate social responsibility indicates that emerging topics are extending established research foundations rather than replacing them.

➤ *Keyword Density and Research Hotspots*

The density visualization provides a complementary view of the thematic concentration within sustainable business research. In Fig. 5, warmer colors indicate areas containing keywords with higher occurrence frequencies and stronger relationships with neighboring terms, whereas cooler colors represent less densely developed areas of the network.

The most intensive research hotspot was located around “performance,” “management perspective,” “business

sustainability,” and “framework.” Other clearly visible concentrations were associated with “corporate social responsibility,” “sustainable development,” “sustainable business model,” and “model.” These areas confirm that the literature has primarily developed around organizational performance, sustainability management, corporate responsibility, and the design of sustainable value-creation systems.

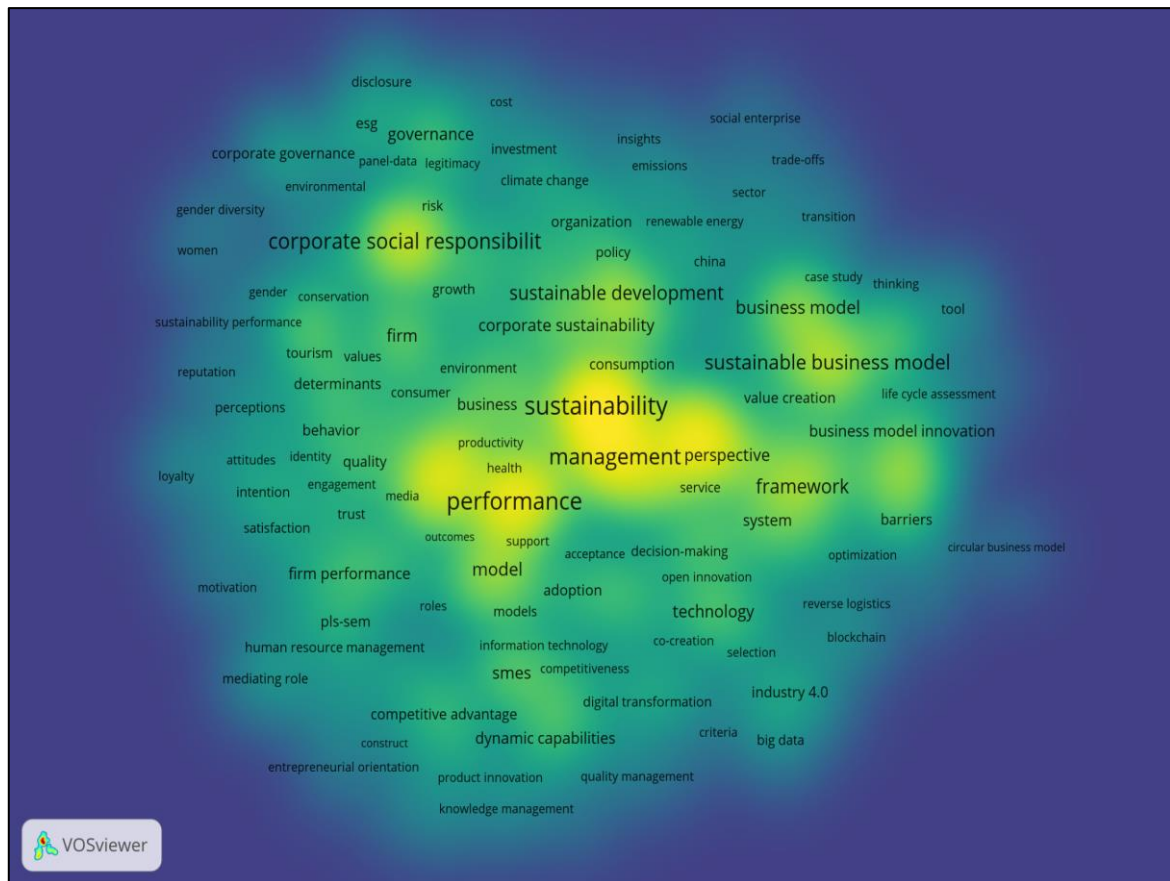


Fig 5 Density Visualization of Keyword Co-Occurrence in Sustainable Business Research.

Keywords related to digital transformation, blockchain, Industry 4.0, big data, dynamic capabilities, and knowledge management appeared in less dense and more peripheral areas. Their position suggests that these topics are more specialized and less consolidated than the central themes, although the overlay analysis indicates increasing recent attention. Taken together, the network, overlay, and density visualizations answer RQ4 by identifying five interconnected thematic clusters and showing a gradual expansion toward governance, technological transformation, organizational capabilities, and data-driven sustainability practices.

V. DISCUSSION

The findings reveal that sustainable business research experienced substantial and uninterrupted growth between 2015 and 2025. The sharp increase observed during the second half of the period suggests that sustainability has moved from a relatively specialized concern toward a central area of

business and management research. This expansion is consistent with the growing pressure on companies to align economic activity with environmental and social objectives, particularly following the adoption of the 2030 Agenda and the Sustainable Development Goals [1]. The results also indicate that the field has developed beyond general discussions of corporate responsibility and now encompasses business model innovation, governance, technological transformation, organizational capabilities, and performance.

The source and citation analyses show that sustainable business research is disseminated across journals from several disciplinary areas. Sustainability-oriented and environmental-management journals accounted for a substantial share of publication output, while some more selective business and management journals displayed stronger citation influence. This distinction confirms that productivity and impact should not be treated as equivalent indicators. A journal, author, institution, or country may publish a comparatively large

number of studies without necessarily recording the highest citation intensity. Conversely, contributors with lower publication volumes may exert considerable influence through a smaller number of highly cited works.

The country analysis demonstrates that the development of the field is strongly international. China produced the largest number of publications, while England displayed the highest overall collaboration strength. The United States, India, Italy, Malaysia, Spain, Australia, and Germany also occupied important positions in the network. Strong bilateral relationships between China and Pakistan, China and the United States, and England and several European and Asian countries illustrate the combination of regional and global research partnerships. The network therefore suggests that knowledge production in sustainable business increasingly depends on international collaboration rather than isolated national research systems.

The keyword analysis provides further insight into the conceptual development of the field. The central position of sustainability, performance, management, corporate social responsibility, sustainable development, and sustainable business models indicates that the literature continues to connect environmental and social objectives with organizational value creation and economic outcomes. This structure is consistent with earlier conceptual studies that describe sustainable business models as mechanisms for creating, delivering, and capturing economic, environmental, and social value [2]–[4]. It also supports previous bibliometric research that identified innovation, circular economy, entrepreneurship, value creation, and corporate sustainability as major components of the field [5]–[7].

At the same time, the five-cluster structure shows that sustainable business research cannot be reduced to business model design alone. One part of the literature focuses on firm performance, consumer and employee behavior, trust, satisfaction, and organizational outcomes. Another examines corporate social responsibility, governance, disclosure, climate change, and financial performance. Additional research streams address digital transformation, information technology, Industry 4.0, blockchain, dynamic capabilities, small and medium-sized enterprises, and competitive advantage. The strong links among these themes indicate that sustainable business is developing as a multidisciplinary field in which strategic, technological, behavioral, and institutional perspectives interact.

The overlay visualization suggests an evolution from the conceptual development of sustainable business models toward more recent empirical and managerial concerns. Topics such as environmental, social, and governance practices, disclosure, digital transformation, dynamic capabilities, and small and medium-sized enterprises appeared more prominently in recent publications. This development may reflect increasing demand for measurable sustainability performance, organizational accountability, and practical mechanisms that enable firms to respond to environmental and social challenges. However, the continued prominence of sustainable business models, corporate social responsibility, and performance shows that

newer topics extend established research foundations rather than replacing them.

The findings have implications for both researchers and practitioners. For researchers, the results identify opportunities to connect relatively fragmented streams of literature. Future studies could examine how digital technologies and organizational capabilities influence the implementation and performance of sustainable business models, while also considering governance and stakeholder expectations. More attention is also needed for the interaction between circularity, social sustainability, and financial viability, particularly in small and medium-sized enterprises and emerging economies.

For managers and policymakers, the results suggest that sustainable business transformation requires more than isolated environmental initiatives. Effective implementation depends on the alignment of governance, innovation, technology, stakeholder relationships, organizational capabilities, and performance measurement. The prominence of collaboration in the country network further indicates that partnerships among universities, companies, governments, and international research communities can support the development and dissemination of sustainable business practices.

VI. CONCLUSION

This study provided a bibliometric overview of sustainable business research published between 2015 and 2025. Based on 4,317 articles and review articles indexed in the Web of Science Core Collection, the analysis examined the evolution of scientific production, influential contributors, international collaboration patterns, and the thematic structure of the field. Performance indicators were combined with co-authorship and keyword co-occurrence analyses to capture both the quantitative development and the conceptual organization of the literature.

The results show that sustainable business research expanded continuously throughout the analyzed period, increasing from 128 publications in 2015 to 831 in 2025. Nearly seventy percent of the documents were published between 2021 and 2025, confirming the growing academic relevance of the field. China recorded the largest publication output, while England displayed the strongest overall international collaboration. The country network also revealed extensive connections across regions, demonstrating that sustainable business has developed as a strongly international research area.

The thematic analysis identified five interconnected research clusters. These clusters addressed organizational performance and behavior, corporate responsibility and governance, technological transformation and management systems, sustainable business model innovation, and organizational capabilities. The overlay analysis further indicated increasing attention to environmental, social, and governance practices, disclosure, digital transformation, dynamic capabilities, and small and medium-sized enterprises. At the same time, sustainable business models, corporate social responsibility, innovation, and performance remained central

to the intellectual structure of the field. The study contributes to the literature by adopting a broader search strategy than reviews limited exclusively to sustainable business models or sustainable business model innovation. It brings together research associated with sustainable business, business sustainability, and sustainable business models and offers an updated representation of the field during the decade following the adoption of the 2030 Agenda. The combination of performance analysis and science mapping also makes it possible to distinguish between publication productivity, citation influence, collaboration intensity, and thematic relevance.

Several limitations should be acknowledged. First, the dataset was restricted to English-language articles and review articles indexed in the Web of Science Core Collection. Relevant publications indexed in other databases, written in other languages, or classified as other document types were therefore not included. Second, the results depend on the selected search expressions, and studies addressing sustainable business without using these terms in their titles, abstracts, or keywords may have been excluded. Third, citation indicators are influenced by publication age, database coverage, and the retrieval date and should not be interpreted as direct measures of research quality. Finally, bibliometric clustering and keyword standardization involve methodological decisions that may influence the resulting network structure.

Future research could compare Web of Science findings with data retrieved from Scopus or other bibliographic databases and could extend the analysis through bibliographic coupling, co-citation analysis, or longitudinal thematic mapping. Further studies may also examine particular industries, geographical regions, or organizational contexts. Particular attention should be given to the interaction among digital technologies, governance, organizational capabilities, circular economy practices, and the measurable performance of sustainable business models. Such research could strengthen the connection between conceptual development and the practical implementation of sustainability within organizations.

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