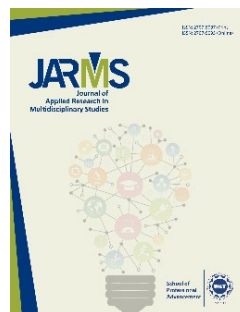
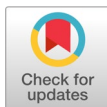


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A Bibliometric Analysis of Managerial Environmental Concern: Trends, Themes, and Key Contributors

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Abstract

This bibliometric study is an effective assessment of the research background of managerial environmental concern between the period of 2000-2025. Based on a dataset obtained from one of the largest scholarly databases, the current work uses a multi-dimensional framework to trace the intellectual map and thematic development of the field in addition to partnership patterns. The results demonstrate an area in a phase of exponential expansion in volume of publication, combined with a mobility in direction towards modern themes, like artificial intelligence. The main intellectual pillars of the study are found to be the concept of sustainability and that of corporate social responsibility that are universally proven to be the most pertinent and the most developed topics. Beyond that, the analysis indicates an internationally distributed research community that has a handful of journals and influential authors serving as a node. Whereas, countries such as China and the USA are the major producers of publications; the US and the UK are the centre of collaboration. By drawing together the major background trends, highly significant contributors, and current major themes of the discipline, the paper offers an excellent guide to academics/researchers seeking to establish an overview of the landscape of the discipline at the time of this writing.

Keywords: bibliometric analysis, environment management, managerial environmental concern, sociometric analysis, sustainability

Introduction

In an era defined by increasing environmental challenges, the role of corporate actors in mitigating these issues has come under intense scrutiny. Although the strategies and technological advances towards the organization have been frequently cited, the intricate, but very essential

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aspect of organizational performance in terms of the environment is the specific attitudes and beliefs of individuals running things or managers in short (Shrivastava, [1995](#)). This has led to the construct of Managerial Environmental Concern, which has been defined as a concept that reflects how a manager perceives the idea, values and prioritizes environmental sustainability into his/her decision-making (Bansal & Roth, [2000](#); Omair et al., [2025](#)).

In examining the environmental concern of managers, there are some important variables that need to be identified and defined since they are common subjects of examination in literature. Managerial Environmental Concern (MEC) is our central variable of interest and it can be described as the awareness, attitude, and valuation of the environmental concerns and the impact it can have on business operations and business strategy of a particular individual manager (Sharma, [2000](#)). The most common way of operationalizing this variable is via survey based measures that determine the extent to a manager's perception of the severity of the environmental problems (Darnall et al., [2008](#)). Conceptualization of MEC is, therefore, essential since it transcends the simple binary perception of either being green, or not being green. In other words, it refers to a manager's cognitive and affective orientation towards sustainability (Hossain et al., [2024](#); Morales-Marroquín et al., [2022](#)).

Managerial environmental concern is not only an ethical inclination, but it is an effective force behind corporate environmental responsibility (CER) and sustainable businesses. Studies have shown that environmental concern at the management level can translate to proactive environmental interventions (Darnall et al., 2008). On the contrary, static views may lead to reactive/compliant responsive practices or worst still the complete disregard of externalities in the global environmental context (Wong, [2022](#), pp. 1990–2020). It is, therefore, of primary importance to cognize the antecedents, consequences, and the dynamics of this construct by both the academics as well as practitioners that are interested in promoting a more sustainable business environment (Sharma, [2000](#)).

The variables may be divided into individual factor, organizational and institutional factors (Bansal & Roth, [2000](#)). The first set of antecedents is individual antecedents wherein the personal values, educational background and previous exposure to environmental problems were found to influence the pro-environmental inclinations of the manager (Saha & Darnton, [2005](#)).

The organizational antecedents include the culture of a firm, commitment of leadership, and formal environmental management systems. As a case in point, such a firm that has a profound culture aimed at sustainability, that would tend to instil the idea of environmental concern among its managers (Russo & Fouts, [1997](#)). Lastly, institutional antecedents refer to the outward pressure exercised by regulating agencies, market, and stakeholders. Installation of more stringent environmental regulations or increased consumer desire of environmentally friendly products can serve as a powerful force and ensure that managers strive to cultivate a better concern regarding the environment (Porter & Linde, [1995](#)).

This paper seeks to present an in-depth bibliometric review of scholarly research in environmental concern by managers. Although there is a considerable amount of literature gathered throughout the last several decades, the discipline is torn to shreds, with its research oriented across different academic areas, such as management, environmental science, economics, and organizational behaviour (Kassinis & Vafeas, [2006](#)). To trace the intellectual net of this literature, it is necessary to conduct a bibliometric analysis as a first step in visualizing the structure of this area and formulating the current paths of fundamental research. The use of bibliometric method can go beyond a narrative review and quantitatively evaluate the development of this field of research, and mark its pillars and new frontiers. The given analysis will also be a guide to future research, highlighting the key missing knowledge and indicating the directions that could be pursued to research one of the most urgent questions at the juncture of business and sustainability (Zhang et al., [2023](#)).

The objectives of this article are addressed through the following questions.

- What is the world pattern of MEC study publications and referrals?
- What is the global trend in citation and publication among the various regions and nations through authorship configuration?
- What are the most prominent players, sources, and countries in MEC research?

Section two in this paper presents methods, data, and research design for the rest of the article. The third section indicates the findings of the bibliometric analyses, examines the key conclusions and shows the

graphical analyses. The fourth section presents the discussion according to the findings of the analyses, the limitation of the study, the application of the study, future research direction and lastly in the fifth section the conclusion is provided (Adjovi, [2025](#); Ayala et al., [2025](#)).

Methodology

Data Organization and Sampling

This paper has made use of Scopus database. Scopus covers more than 20,000 peer-reviewed journals including the ones published by Emerald, Elsevier, Springer, Taylor & Francis, Informa, and Inderscience (Yadav et al., [2022](#)). In the current study, Scopus was used exclusively due to its data accuracy (Donthu et al., [2021](#)). Pranckute ([2021](#)) argues that Scopus is a more effective means of assessing the outcomes of research because it has a built-in interface and scope (Pranckutė, [2021](#)). In addition, it is also permissible to use the same database in bibliometric studies (Kanmodi et al., [2022](#)). In addition, narrower study areas, e.g. the literature on MEC, would not be sufficiently covered in other databases, and Scopus would be more suitable to achieve the purpose (Khuram et al., [2023](#)). The researchers indicate that one of the strong points of the Scopus database is the ability to cover research in social sciences widely (Merigó & Yang, [2017](#); Wang et al., [2010](#)).

Table 1

Document Selection Criteria from Scopus

Sr	Search Steps	Records
1	All documents with the word "Managerial Environmental Concern" OR "MEC" in the title, abstracts and keywords	5432
2	Limit to 2000–2025	4054
3	Limit to Language- English	3012
4	Primary documents	2471

The search strategy followed to collect the relevant data is as follows: TITLE-ABS- managerial environmental concern AND PUBYEAR > 1999 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTKEYWORD , "Sustainability") OR LIMIT-TO (EXACTKEYWORD , "Corporate Social Responsibility") OR LIMIT-TO (EXACTKEYWORD , "Sustainable Development") OR LIMIT-TO (

EXACTKEYWORD , "Innovation") OR LIMIT-TO (EXACTKEYWORD , "Corporate Governance") OR LIMIT-TO (EXACTKEYWORD , "Environmental Management") OR LIMIT-TO (EXACTKEYWORD , "Environmental Economics")) AND (LIMIT-TO (LANGUAGE , "English"))

The data collection process involved a systematic search for documents published from 2000 to 2025 (Gaviria-Marin et al., [2019](#)). The search query targeted the terms "Managerial Environmental Concern" within the title, abstract, or keywords of all document types. To ensure the quality and relevance of the dataset, only the documents published in English were included. We excluded non-English articles primarily due to practical constraints, such as the high cost, time, and potential inaccuracy of translating technical data. Additionally, English serves as the global lingua franca of science, meaning the vast majority of high-impact, peer-reviewed research is already available in English. However, this choice must be transparently declared as a limitation, as it can introduce language bias by potentially omitting localized data or studies with negative results. This systematic filtering process resulted in a final dataset of 2,471 records, which were subsequently analyzed using bibliometric indicators such as authors, institutions, countries, and publication sources.

Research Design

The research question will be addressed through the use of VOSviewer (Lüdecke et al., [2021](#)) and the R Packages biblioshiny (Yu et al., [2018](#)). VOSviewer was used to create maps of countries using an existing dataset created from co-citation networks to form a map of keywords as determined by each authors shared networks (Rahmawati & Subardjo, [2022](#)). It was also possible to use this software to perform data-mining, map articles, and group articles retrieved from different databases (Effendi et al., [2021](#)). Table 1.

Bibliometric Analysis

A large sample of peer reviewed publications was analyzed with the bibliometric technique to determine the quality, and trend of publications within a specified period. A sample of peer-reviewed articles from a number of established journals was analysed by the use of a bibliometric technique to evaluate the publication quality of a large number of peer-reviewed journals along with the trends of journal publication during the designated

time period (Struck et al., [2021](#)). In case of scientific identification, full statistics, and systematization of literature, scientists can promptly translate a mass of documents and retrieve all the necessary information (Guo et al., [2019](#)). It is also significant to point out that co-citation and co-occurrence analysis remain the key methods in bibliometrics (Boyack & Klavans, [2010](#)). The bibliometric approach has allowed scholars to statistically describe the environment of various fields (Khuram et al., [2023](#); Majeed & Ainin, [2021](#)). Figure 1. The details of the analysis are also provided in Table 2.

Figure 1

Principal Stages in the Typical Bibliometric Research

Stage 1 Historical Evolution	Breakdown of the historical evolution of the core themes embedded in business ethics publications through titles, abstracts and key words.
Stage 2 Co-citation Analysis	Profile of the leading co-cited references and sources on business ethics matters.
Stage 3 Co-authorship Analysis	Analysis of the networks formed by co-authorship collaborations among countries on the business ethics debate.
Stage 4 Intellectual, Knowledge and Conceptual Structure	Bibliometric indicators of relatedness have been used to build bibliometric networks based on co- citation analysis (to measure intellectual structure) and co-word analysis (to measure knowledge or conceptual structure).
Stage 5 Time Zone - Key word Analysis	Breakdown of the key word co-occurrence analysis based on the time zone of publication to show the advancement of keywords over four different time periods.

Results

Data Set

Conducting bibliometric research analysis is essential for this study (Souza & Bueno, [2022](#)). The dataset is divided into four main parts, each examined and evaluated in the context of managerial environmental concern.

Primary Information about the Data

The data used in this bibliometric evaluation was identified by searching one of the study databases, namely, Scopus, applying a group of keywords

intersecting with the concept of managerial environmental concern. The data is spread over the period between 2000 and 2025, therefore, guaranteeing a complete perspective of the development in this area for over twenty years. Bibliometric software was used to undertake the analysis using raw data to produce the resulting tables and figures, such as those of publication trends, thematic clusters, author and country networks. Publication year, author names, journal titles, citation counts, keywords, and country of origin are considered as the main data that can be analyzed with the help of this research (IT Governance Privacy Team, [2025](#)).

Table 2
Analysis unit and Sub-Components

Analysis Unit	Sub-Components
Data Set	Primary information about the data
	Annual scientific production
	Average citations per year
	Three-field plot
Sources	Most relevant sources
	Cite score publication per year
	Most relevant authors
Authors	Authors’ contribution toward HEIs’ societal impact
	Country scientific production and citation analysis
	Corresponding authors countries
Document	Most globally cited articles
	Document by subject area and type
	Word cloud
Conceptual Structure	Thematic map
	Factorial Analysis
Intellectual Structure	Co-citation network

Annual Scientific Production

A bibliometric analysis was conducted to examine publication trends from 2000 to 2025, with the annual distribution of published documents presented in Table 3. The dataset tracks the volume of scientific articles year by year and is structured into three main columns. Overall, the data reflect a strong upward trend in research output over the 25-year period. Following

a modest start of just 5 articles in 2001, publication counts experienced minor fluctuations in the early years before reaching 109 articles in 2016. Growth accelerated significantly in the latter half of the timeframe, culminating in a peak of 429 articles in 2024, demonstrating a substantial and sustained increase in scientific interest over the past quarter-century.

Table 3

Annual Scientific Production

Year	Articles	Year	Articles	Year	Articles
2001	5	2009	38	2017	115
2002	2	2010	41	2018	140
2003	9	2011	43	2019	156
2004	4	2012	62	2020	198
2005	13	2013	62	2021	232
2006	14	2014	75	2022	256
2007	28	2015	92	2023	327
2008	21	2016	109	2024	429

Average Citation per Year

The Table 4 shows the data of the citation performance of scientific articles from 2000-2025. It displays the "MeanTCperArt" (mean total citations per article), N (number of articles), the "MeanTCperYear" (mean total citations per year) and, CitableYears, in each year. The count in the number of articles ("N") is steadily increasing, but the indicator of citations has a more complicated picture. The MeanTCperArt and MeanTCperYear figures vary enormously, with results in some earlier years, such as 2003, showing well above the maximum, and more recent years, such as 2023 and 2024, showing way below the lowest, given the great number of articles

Three-field plot

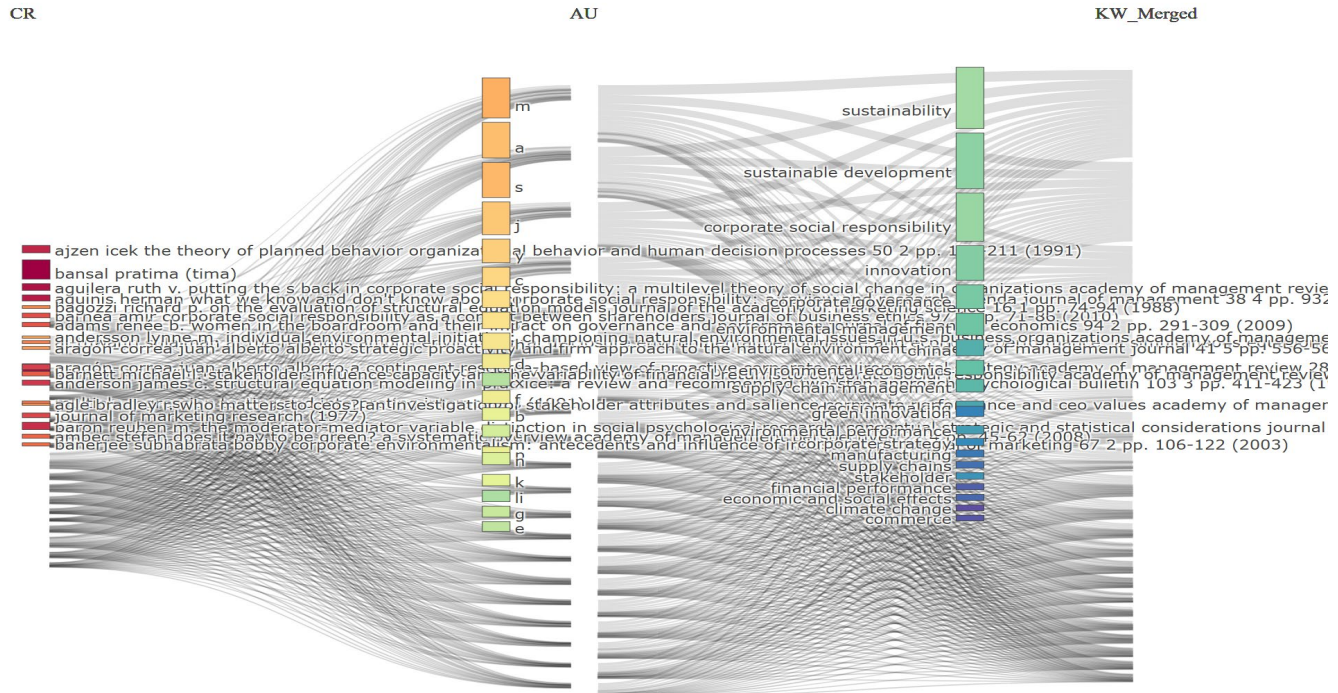
The three-plot graphically indicates links between the various fields of study in Figure 2. In the left-most column, which is marked as CR (Cited References), they have the most important articles as a basis. The middle column, AU (Authors) seems to indicate treatment of articles authored by particular authors, whereas the last column, KW_Merged (Merged Keywords) points to the prevalent research topics. Lines of different thicknesses are used in the plot to depict the direction and dynamics of connections, denoting the referred sources that are related to the works of particular authors and, consequently, the particular themes.

Table 4*Average Citation per Year*

Year	MeanTCperArt	N	MeanTCperYear	CitableYears	Year	Mean TCperArt	N	Mean TCperYear	Citable Years
2001	270.8	5	10.83	25	2013	143	62	11	13
2002	89.5	2	3.73	24	2014	108.93	75	9.08	12
2003	727.22	9	31.62	23	2015	88.82	92	8.07	11
2004	291.25	4	13.24	22	2016	111.14	109	11.11	10
2005	335.15	13	15.96	21	2017	129.97	115	14.44	9
2006	221.93	14	11.1	20	2018	96.51	140	12.06	8
2007	146.68	28	7.72	19	2019	98.45	156	14.06	7
2008	357.57	21	19.86	18	2020	75.25	198	12.54	6
2009	126.37	38	7.43	17	2021	62.07	232	12.41	5
2010	127.07	41	7.94	16	2022	38.09	256	9.52	4
2011	179.21	43	11.95	15	2023	26.17	327	8.72	3
2012	195.45	62	13.96	14	2024	11.19	429	5.6	2

Figure 2

Three-field Plot



Specifically, a thick-gray line links a cluster of cited references on the left to specific author areas in the middle of the page, then to bright keywords such as sustainability, sustainable development and corporate social responsibility on the right. This visualization is a powerful way of displaying the intellectual descent of a given field of research, how canonical publications affect particular authors and what broad themes there are to their publications.

Sources

Most Relevant sources

Table 5 includes the list of the top academic journals according to the number of the articles published on a specific topic. It reveals a distinct level of rankings, in that the journal BUSINESS STRATEGY AND THE ENVIRONMENT tops the list with 275 articles, second rank goes to the JOURNAL OF CLEANER PRODUCTION with 267 articles. The rest of the sources show a sharp decline in the number of articles with journals such as the JOURNAL OF BUSINESS ETHICS and TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE including 97 and 91 articles, respectively. The statistics show that the number of journals processing the research in question is strongly biased towards certain main sources, whereas other sources were also represented by a substantial number of articles, which is representative of the major sources and minor ones serving this particular area of research.

Table 5

Most Relevant Sources

Sources	Articles
BUSINESS STRATEGY AND THE ENVIRONMENT	275
JOURNAL OF CLEANER PRODUCTION	267
JOURNAL OF BUSINESS ETHICS	97
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	91
CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL MANAGEMENT	71
SOCIAL RESPONSIBILITY JOURNAL	42
INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	38

Sources	Articles
CORPORATE GOVERNANCE (BINGLEY)	33
JOURNAL OF SUSTAINABLE TOURISM	29
CORPORATE GOVERNANCE: AN INTERNATIONAL REVIEW	28
JOURNAL OF RETAILING AND CONSUMER SERVICES	27
COGENT BUSINESS AND MANAGEMENT	26
JOURNAL OF BUSINESS RESEARCH	25
INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	24

Authors

Authors' Contribution

Table 6 and Figure 3 provide the list of authors and the number of citations of these authors. The table is called most relevant authors with citations and it is ranked in a reverse order of the citation count. Adams received the highest number of citations (362), while Aguilera and Ruth followed, each accumulating 205 citations. The next is the ranking of two papers of Anderson with 228 citations. The number of citations reduces in a descending trend towards the end of the list where the final author is, Jamers C., with 83 citations. The table is an effective tool of pinpointing and ranking the most influential writers in a given field in line with the frequency of the encounters of their writings.

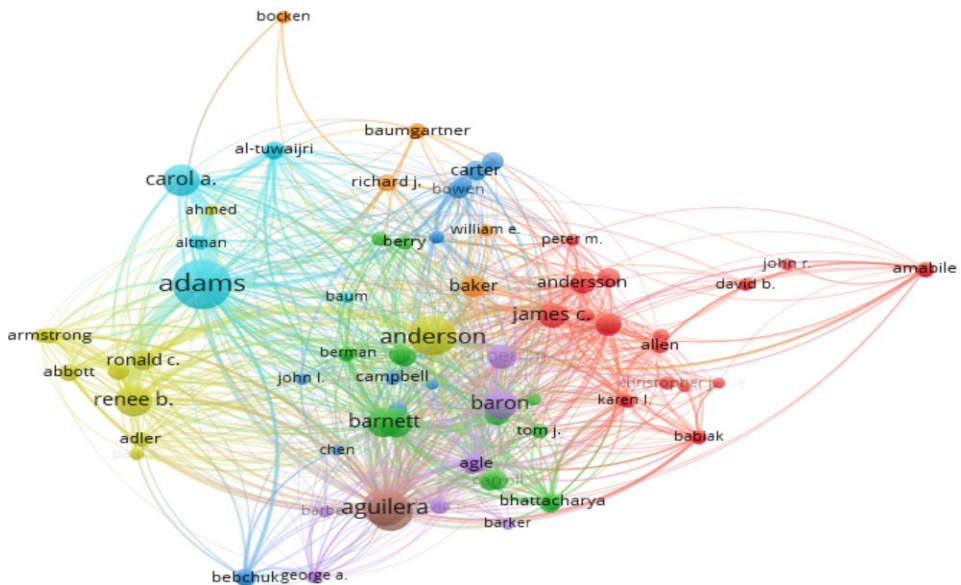
Table 6

Authors' Contribution

Sr	Authors	Citation
1	Adams	362
2	Aguilera	205
3	Ruth v.	205
4	Anderson	228
5	Renee B.	145
6	Carol A	147
7	Barnett	127
8	Michael. I	124
9	Baron	128
10	Jamers C.	83

Figure 3

Author Citation



Country Scientific Production & Citation Analysis

Table 7 contains results of the highest 15 regions according to the frequency of publication, which determines geographical disbursement of the research output in a specific issue. China comes first with a rate of 1015, then the USA with 887, followed by the UK with 555. The frequencies see a tremendous decline behind the first three countries, such that Italy and Spain drop to 459 and 395, respectively. The countries of different continents such as India, Australia, Canada, and Brazil are listed which demonstrates rich multi-continental participation in the research. At the bottom-end there is Pakistan in the 15th position at a frequency of 105. One can also see the graphical presentation in Figure 4.

Table 7

Countries Scientific Production

Sr	Region	Freq
1	CHINA	1015
2	USA	887
3	UK	555

Sr	Region	Freq
4	ITALY	459
5	SPAIN	395
6	INDIA	363
7	AUSTRALIA	352
8	CANADA	254
9	MALAYSIA	244
10	GERMANY	201
11	FRANCE	169
12	INDONESIA	132
13	BRAZIL	131
14	NETHERLANDS	115
15	PAKISTAN	105

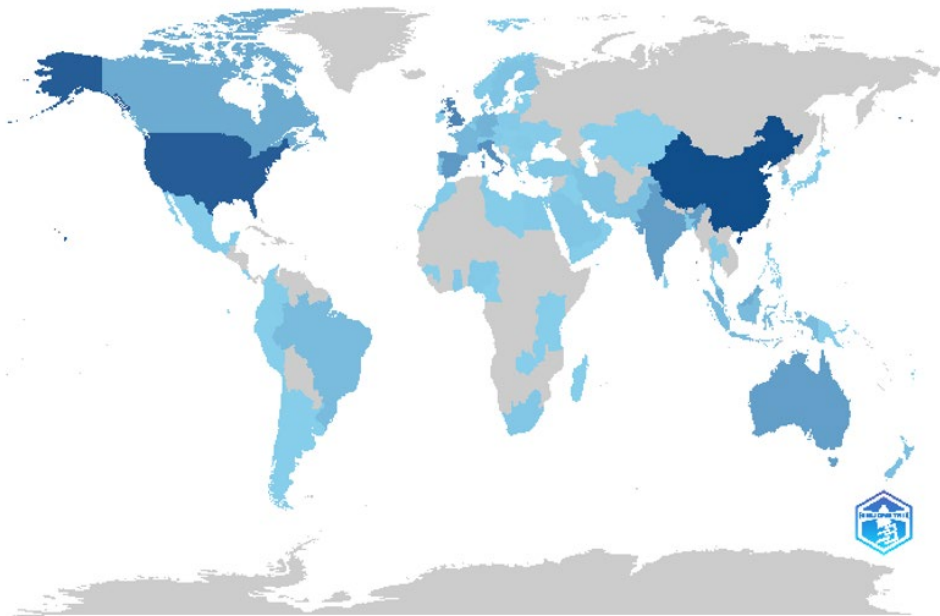
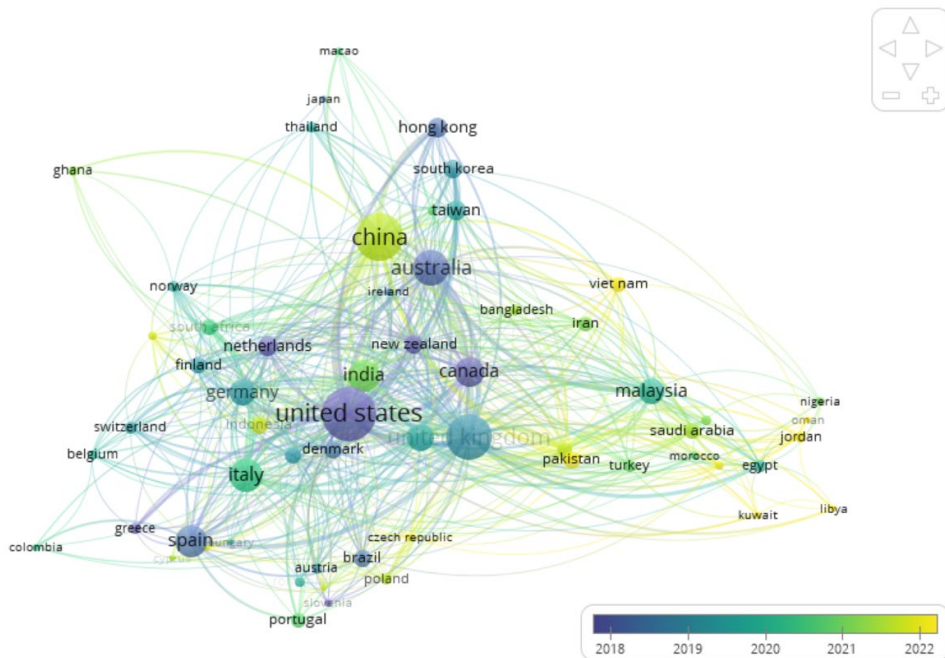
Figure 4*Countries Scientific Production****Most Relevant Countries by Corresponding Authors***

Figure 5 uses a network map of country co-authorships to reveal how global research collaboration evolved between 2000 and 2025. The nodes depict the countries and the size of nodes is proportional to the number of

publications and the lines are indicative of collaboration. The nodes and the lines will be coloured according to the average year of publication, starting at purple (2018), going through green/yellow (2022) and displaying the changes in the collaborative networks over the years. The United States and the United Kingdom are placed in the centre and they are large bold nodes indicating that they are major centres of partnership and the other major nodes such as China and Australia have a great extent of connections. The network displays that there is cross-network collaboration and certain areas, especially those with more nodes are the centrality points where international research partnerships occur.

Figure 5

Most Relevant Countries by Corresponding Authors



Documents

Most Globally Cited Articles

The Table 8 contains a list of most-cited academic papers in a rank of total number of citations. It contains columns of the abbreviated title and year of publishing of the paper, its Digital Object Identifier (DOI), and three

citation metrics, Total Citations, TC per Year (citations per year), and Normalized TC (Normalized Total Citations). The article entitled ORGAN by M, 2003. STUD." With its total citations, ranks first (5079), whereas the article by SA, 2008, J. CLEAN. PROD." has the largest value of TC per Year = 259.1. It is also seen in the table that one of the papers, which is a more recently published paper, by "S, 2019, INT. J. PROD. RES.," has a high TC per Year of 388.9 and a highest Normalized TC of 27.6, implying a big impact in a short period. The statistics indicate that older papers have longer time to accrue large number of citations and new papers could show high impact with just large number of citations on a per-year basis, depicting its immediate relevance and impact to the field.

Table 8*Most Globally Cited Articles*

Paper	DOI	Total Citations	TC per Year	Normalized TC
M, 2003, ORGAN. STUD.	10.1177/0170840603024003910	5079	220.8	7.0
SA, 2008, J. CLEAN. PROD.	10.1016/j.jclepro.2008.04.020	4664	259.1	13.0
H, 2012, J. MANAG.	10.1177/0149206311436079	2878	205.6	14.7
S, 2019, INT. J. PROD. RES.	10.1080/00207543.2018.1533261	2722	388.9	27.6
S, 2017, MIS QUARTERLY: MANAG. INF. SYST.	10.25300/MISQ/2017/41:1.03	2189	243.2	16.8
A, 2017, J. BUS. ETHICS	10.1007/s10551-015-2693-2	2176	241.8	16.7
J, 2016, J. RETAIL. CONSUM. SERV.	10.1016/j.jretconser.2015.11.006	1560	156.0	14.0
Y, 2012, ACCOUNT. REV.	10.2308/accr-10209	1344	96.0	6.9
JD, 2007, J. OPER. MANAG.	10.1016/j.jom.2007.01.012	1331	70.1	9.1
RM, 2005, J. ACCOUNT. PUBLIC POLICY	10.1016/j.jaccpubpol.2005.06.001	1300	61.9	3.9
AA, 2005, BENCHMARKING	10.1108/14635770510609015	1153	54.9	3.4
SA, 2009, CORP. GOVERNANCE: INT. REV.	10.1111/j.1467-8683.2009.00742.x	1141	67.1	9.0

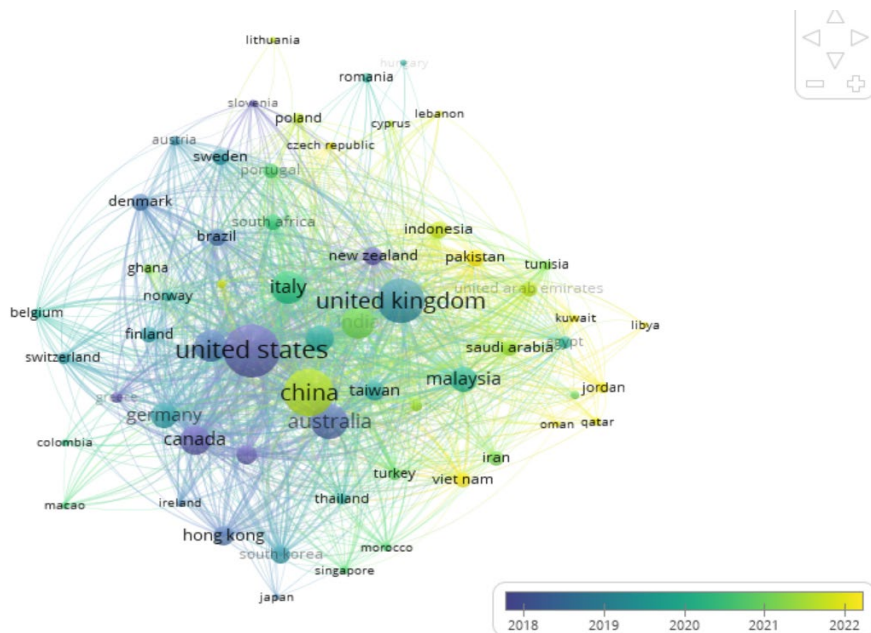
Paper	DOI	Total Citations	TC per Year	Normalized TC
H, 2011, J. BUS. ETHICS	10.1007/s10551-011-0869-y	1048	69.9	5.8
W, 2008, ORGAN. ENVIRON.	10.1177/1086026608318042	1039	57.7	2.9
LJ, 2004, AUDITING	10.2308/aud.2004.23.1.69	965	43.9	3.3

Document by Subject Area, Type and Affiliations

Figure 6 is a network visualization of the countries according to the co-authorship relationships (their connections), and it provides the distributions of the global collaboration patterns in a research field during the period between 2000 and 2025. Countries are the nodes, and the size of the nodes reflects the number of publications, and the lines represent the collaborations.

Figure 6

Bibliometric Coupling by Country



The nodes and lines are also colored which indicates the average year of a publication undergoing a transition between purple (2018) and

green/yellow (2022) thus showing how collaborative networks change with the times. The United Kingdom and the United States have big nodes, indicating that those two countries are central hubs of collaboration, whereas other large nodes, such as China and Australia, also have large number of connections. The network depicts that the collaboration is pervasive, although regions on the periphery with bigger nodes are central locations of international research collaborations.

Figure 7

Bibliometric Coupling by Authors

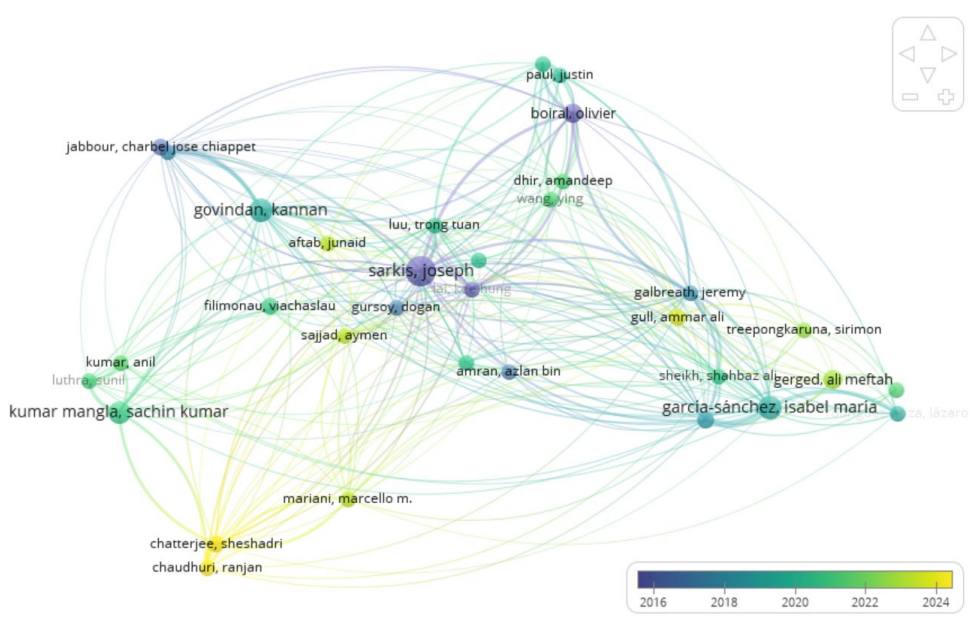
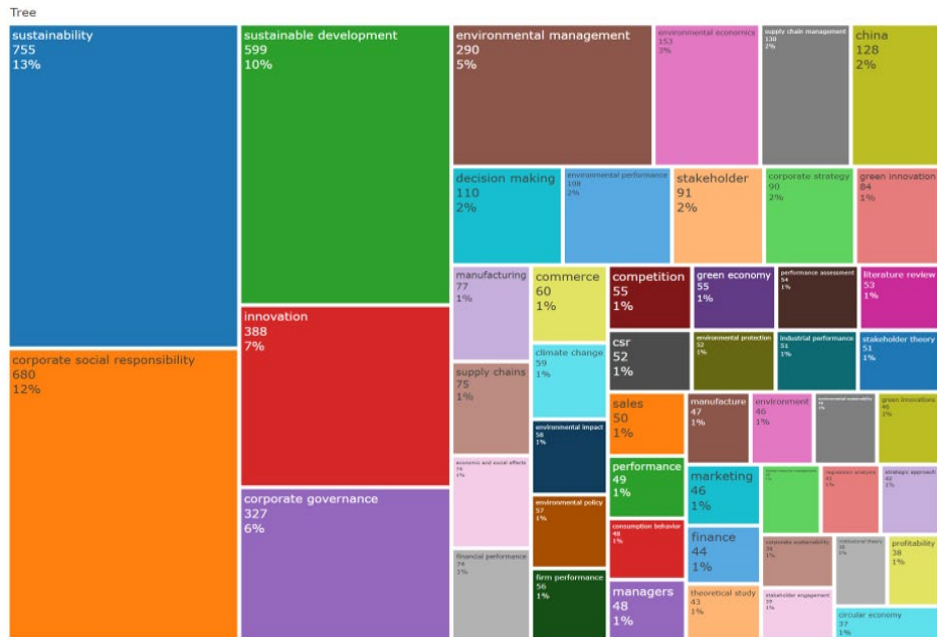


Figure 7 is a co-authorship diagram visualizing the network of the collaborators of authors in a definite research direction. The individual nodes depict an author, and the larger their size, the more publications, and therefore the more productive they are considered. The co-authorship links between the nodes are shown as lines whereby the line thickness corresponds to the level of collaboration. The node and line colors go from purple to yellow from the years 2000 to 2025. The network map shows that authors also form clusters where they are frequently joined in collaborations, e.g. the cluster around the authors Sarkis, Joseph, Chatterjee, Seshadri, and Kumar, Anil. The chart successfully plots the social and

environmental management which also take up a lot of space. The shorter rectangles are rare topics, such as, stakeholders, manufacturing, decision making. The treemap works well in the organization of the data, revealing which areas are most visible, and how these areas are connected to each other and to the larger areas of focus in the field with the largest boxes representing the most important points of interest in the field (Kunkel & Ziegler, 2023).

Figure 9

Tree Map



Conceptual Structure

Thematic map

A two-dimensional graph (Figure 10), or a strategic diagram, is a visual representation of research themes developed in terms of relevance and evolution. Relevance degree (Centrality), the horizontal axis is a scale that assesses the degree of centrality or interconnectivity of a theme, whereas the degree of development (Density), the vertical axis measures the degree of well development or density of theme.

Figure 10

Thematic Map

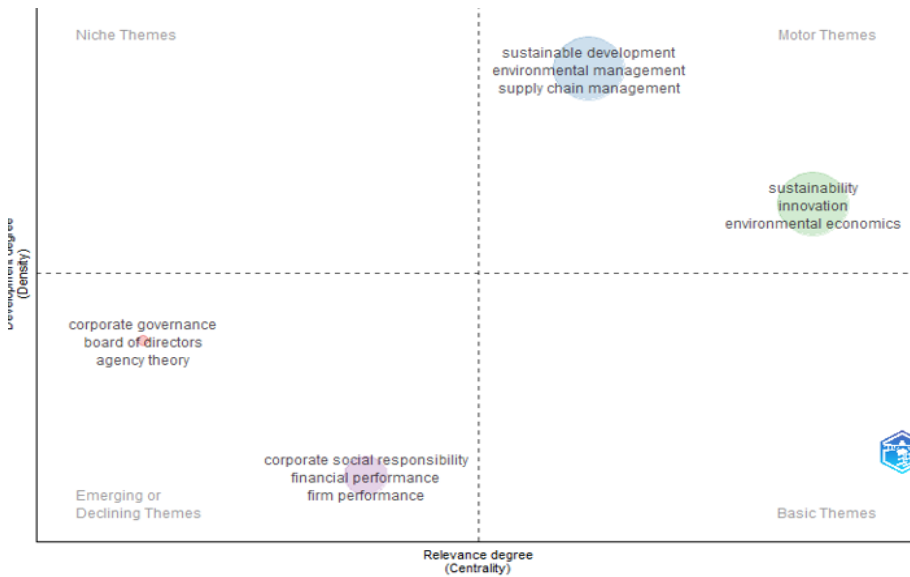
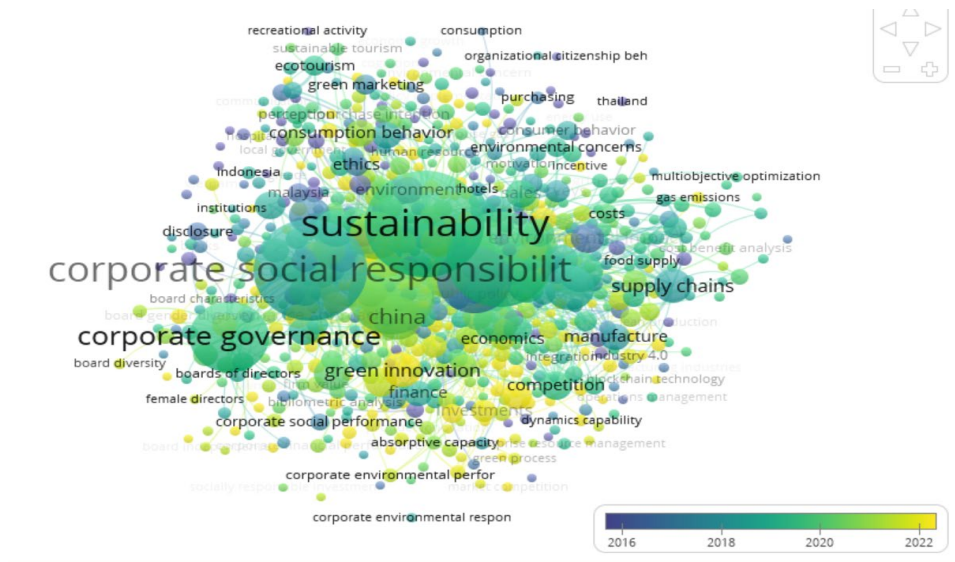


Figure 11

Keywords by Documents



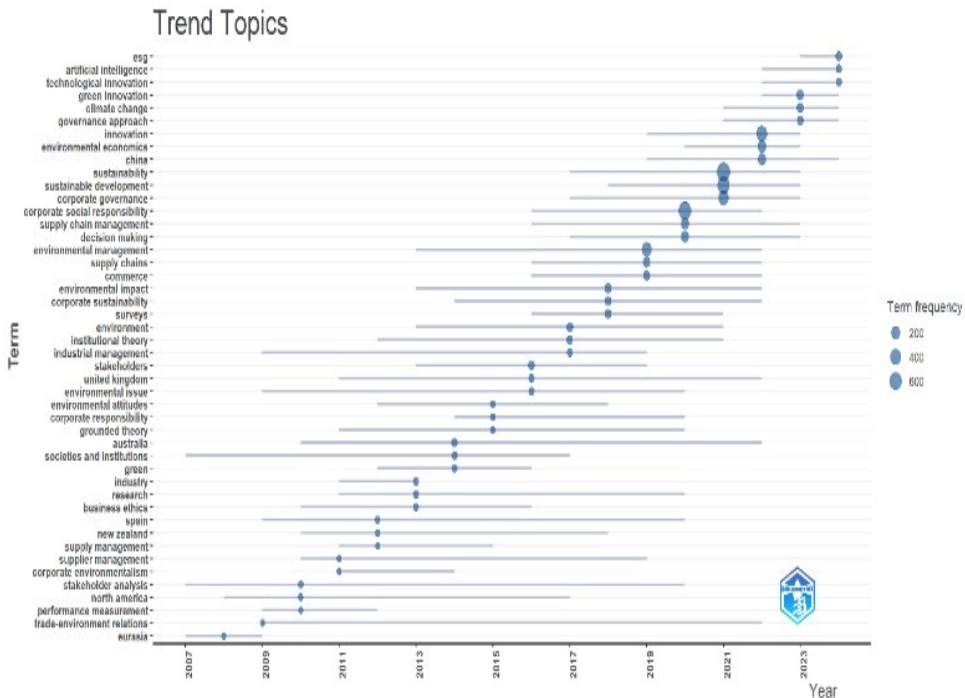
The top-right quadrant (labeled "Motor Themes") has very relevant and well-developed themes (sustainability, innovation, environmental economics, etc.), which is an indication that it is the core of the field. Top-left quadrant is the quadrant of "Niche Themes," where themes are well developed yet hold little relevance. The side with bottom right corner has the category of basic themes that have yet to be developed but are relevant. Lastly, the bottom-left quadrant contains the category of "Emerging or Declining Themes," which happen to both be undeveloped and not of high relevance like the phrase, "corporate governance," referring to spots that might be new or losing its place in the research arena. Figure 11 also gives the highlights about the use of keywords and time (Esfahani et al., [2019](#)).

Trends Topics

The following bubble chart is known as Trend Topics that displays how the research topics change over time between 2000 and 2025 (Figure 12).

Figure 12

Trends Topics



The y-axis shows different terms, whereas the x-axis shows the years. Every horizontal line represents the topic, and bubbles on the line show whether the topic was present in a given year or not. The frequency of the term is represented in the size of the bubbles where the bubbles with a greater size indicate greater frequency of occurrence. The chart indicates that themes such as the "Eurasia" and the "trade-environment interactions" had been there in the early years but then got lost, whereas themes such as artificial intelligence, ESG, the technological innovation, and green innovation in the world are relatively new and have been increasing rapidly since the mid-2017 onward. The graph is helpful in showing which subjects are novel and coming into the limelight as well as which topics are old-timers that have always been in the research scene (Borgatti et al., [2009](#); Thibenda et al., [2022](#)).

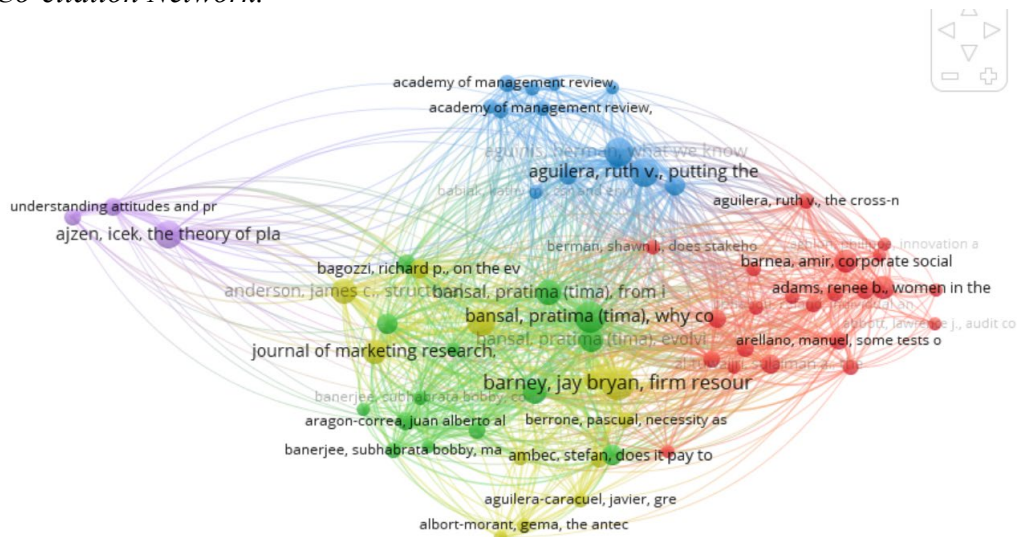
Intellectual structure

Co-citation Network

Figure 13 is a map, drawn in the form of a co-citation network of scholarly articles, the nodes of which are articles and the links between the nodes denote the co-citation links (that is, they are cited together in other articles).

Figure 13

Co-citation Network.



The network has been grouped in clusters and classified by color and the size of each node could be the number of times it has been cited which points out to its influence (Chen et al., [2010](#)). As an example, works by Agreilera, Ruth V. are in a big blue cluster up and to the middle whereas those by Barnea, Amir and Adams, Renee B are in a big red cluster to the right. Other sets of related research are also highlighted through the use of the green and yellow clusters. This sort of graph is used to visually represent the intellectual landscape or map of a research area, to see which publications are foundational to the field, how they interrelate with one another, and which sub-areas or schools of thought within a larger topic exist (Kashani et al., [2023](#)).

Discussion

The study provides an overview of the current status and development of the research field by integrating evidence from multiple bibliometric analyses. The findings indicate that the field is highly dynamic in its growth, that there is a thematic priority of sustainability, and that there is an established, interconnected and global network of influential journals, institutions and authors (Ogutu et al., [2023](#)). The most impressive conclusion that the analysis of scientific production brings is the existence of exponentially growing number of its publications. Table 3 reveals that an ever-dramatic rise has occurred in annual article output such that in 2001 an output of just 5 articles per annum changed to 429 in 2025.

The presentation of the "Trend Topics" bubble chart (Fig. 12) confirms the trend further because it shows the rise and growing number of topics with time. They include new keywords such as artificial intelligence, technological innovation, as well as ESG that grow and become more prominent both before and especially after 2017, which indicates that the discipline is not only increasing in terms of size but also in terms of covering new and relevant topics related to modernity (Huang et al., [2020](#)). Contrary to the number of articles which has grown, another picture is given by the data in Table 4 regarding citations per year. It demonstrates a variable level of citations, at a lower number in the recent years in general (Hassan & Duarte, [2024](#)). This is typical of bibliometric studies because more recent papers have fewer chances to earn citations. (Khuram et al., [2023](#)).

In the thematic analysis, the focus has always been around sustainability and corporate social responsibility (CSR) as the major concepts of the

research area. This is graphically confirmed by the word cloud (Fig. 8) where the largest and most repeated terms therein are sustainability and sustainable development. This is also supported by the treemap (Fig. 9), which shows the dominance of these topics assigning them the highest and most noticeable rectangles with big percentage of total occurrence (Amoozegar et al., [2018](#)). These themes' role can be understood in detail in terminology of the strategic diagram (Fig. 10). Depicting sustainability, sustainable development, innovation, and environmental management as Motor Themes show that they are not only where it is at, as they are highly relevant, but are also well developed, and thus the current research agenda. The three-field plot (Fig. 2) is then used to relate these themes to their intellectual roots, indicating important articles and key authors who have influenced the discussion on these themes that constitute the topic of interest and lay deep-rooted foundations to them (Bonang et al., [2025](#)).

A set of leading journals and writers characterizes the intellectual geography of the discipline. As revealed in table 5, the most pertinent sources are highlighted, whereby the most prominent outlets of the research are the issue of "BUSINESS STRATEGY AND THE ENVIRONMENT" and the journal of "JOURNAL OF CLEANER PRODUCTION". This concentration gives an indication that there is a limited growth in the field which sticks to few main journals which determine the parameters of the field. Equally, seeing Table 6, the most cited authors can be shown in rank order and the most important ones are: Adams and Aguilera who are the opinion leaders. This author-centric picture is supplemented by the network of co-authorship (Fig 6), visually displaying relationships in terms of collaborative relationships. It depicts clear groupings of authors who collaborate with one another often with some important individuals such as Sarkis, Joseph and Chatterjee, Sheshaddri serving as their central points of working. Such results imply that the research community is not a unified unit but rather consists of a number of interrelated sub-communities (Hassan & Duarte, [2024](#)).

In addition to the connections between authors at the level of the author co-citation network (Fig. 6), one can analyse the co-citation network in a more fine grained manner at the level of distinct authors (Fig 7). Co-cited articles are presented in differentially coloured clusters that demonstrate various schools of thoughts or sub fields. To give an example, the large red cluster contains articles about corporate social responsibility and

governance whereas the blue cluster contains works by "Aguilera, Ruth V." indicating a sub-field on the practical application of theory. The clustering demonstrates which foundational works are most often quoted together, offering a map of the intellectual architecture of the field and its broad sub-domains.

Lastly, the geographical analysis is used to show how this research is global in nature. The table of regions (Table 7) singles out China, USA, and UK as the most productive countries. Nevertheless, the co-authorship network (Figure 8) suggests that, in addition to some countries such as China with high publication rates, other countries, such as the United States and the United Kingdom, are the hubs of international co-authorship. Such a difference is critical because it indicates that the degree of centrality in the global network can be reached based on the large number of publications, but also upon the quantity of the collaborative connections and their strength.

Conclusion

This bibliometric analysis underscores that as corporate sustainability transitions from a voluntary public relations effort to a regulated governance standard, policymakers must transition from rigid punitive measures to dynamic, collaborative frameworks. By identifying expanding research clusters around green technology innovation and adaptive environmental governance, the findings imply that regulatory policies should incentivize proactive corporate initiatives, such as standardized ESG reporting and green supply chain management. Ultimately, these structural insights provide a data-driven roadmap for authorities to align environmental compliance mandates with regional business realities, transforming managerial environmental concern into a measurable catalyst for sustainable development.

Author Contribution

Muhammad Usman Siddique: conceptualization, data curation, formal analysis, investigation, methodology. **Sarfraz Zaman:** resources, visualization, writing – original draft. **Sohail Riaz:** project administration, supervision. **Asim Manzoor:** writing – review & editing, software

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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