

# Environmental, Social and Governance: a Citation and Mapping Analysis based on Bibliometric Methods

Dr. Shikha Gupta

Associate Professor, Department of Commerce, Shaheed Bhagat Singh College, University of Delhi, Delhi, India

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## Abstract

Given the focus on corporate sustainability, Environmental, Social and Governance (hereafter ESG) have become of the most rapidly growing areas of research. The present study attempts to examine the extant research literature in the field of ESG to present publication metrics, cooperation status, hotspots, evolving research trends, and offer directions for future research. To achieve research objectives, bibliometric methods like performance analysis, citation analysis, network analysis, trend analysis, and thematic mapping were employed on a sample of 840 documents retrieved from the Scopus database for the period 1990- 2021. Biblioshiny application of R-studio software was utilised for this purpose. It was found that extensive research in the field of ESG started in 2011 and the last four years have seen exponential growth. USA is the key contributor followed by Italy and UK and most of the top contributing countries are working in collaboration. Using citation analysis, the study identified the most influential journals, authors, and documents in the research field. Corporate social responsibility and corporate governance are the well-matured themes of ESG. Presently, the research focus is on ESG investing and the study sees a lot of scope of research in the area of ESG disclosures; ESG ratings; and the perceived influence of a corporate's ESG performance on its financial performance. The study provides invaluable insights into the present research status and offers directions for future research to fill the research gap. There are very few bibliometric studies on ESG at present.

**Keywords:** Environmental, social and governance, ESG, bibliometric analysis, Scopus database, Biblioshiny, citation analysis, thematic mapping.

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Date of Submission: 18-05-2022

Date of Acceptance: 02-06-2022

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## I. Introduction

The concept of sustainable development is not new. However, it means “different things to different people in different contexts” (Bebbington 2001) and therefore, its precise definition is still elusive. It is often best described as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland et al. 1987). The concept is as much applicable to corporations as to governments around the world. The performance of an economy is no longer judged by GDP numbers but also by the policies and programs it implements to address environmental and societal concerns. In the same way, corporations are also a part of the ecosystem and therefore should not only be driven by profits and market value but also undertake responsibility towards various stakeholders. It draws resources from the society and therefore is morally and legally bound by a ‘social contract’ to repay in the form of social good and environmental protection and enhancement measures. For a business to be sustainable, it must be financially secure as evidenced by measures of profitability, it must minimize its negative environmental impact and act in conformity with society’s expectations (Deegan, 1996). The issues of Environmental, Social, Governance and sustainable development are closely intertwined.

Presently, the world is shaken by the novel coronavirus (COVID-19) pandemic. It has created a global crisis-like situation as the health and livelihood of millions of people are severely impacted. This, and other environmental disasters in the past like the Bhopal gas tragedy, the oil spill in the Gulf of Mexico, etc. have reminded us of the fragility of the environment we live in and hence the need to adopt environmentally responsible behaviour. Moreover, numerous corporate scandals like BCCI, Enron, Satyam, WorldCom, etc. shook the world and created distrust as to the conduct of businesses. These developments led to the adoption and acceleration in the field of ESG.

## II. Theoretical Background and Study Objective

ESG originated from the concept of Socially Responsible Investment (SRI). SRI has been defined as “a strategy and practice to incorporate environmental, social and governance (ESG) factors in investment decisions and active ownership” (PRI<sup>35</sup>). Thus, ESG is a strategy adopted by investors to evaluate a firm’s collective

efforts for environmental, social, and governance factors. It is a quantitative figure that is arrived at from the evaluation of these factors related to an enterprise (see Table 1).

**Table 1: ESG Factors**

Dimension	Factors
Environmental (E)	<ul style="list-style-type: none"> <li>• Energy consumption and efficiency</li> <li>• Air emissions and control measures</li> <li>• Water usage and recycling</li> <li>• Land contamination and remedial measures</li> <li>• Hazardous waste production and management</li> <li>• Impact on biodiversity and ecosystems</li> <li>• Adoption of eco-efficient technology</li> </ul>
Social (S)	<ul style="list-style-type: none"> <li>• Freedom of association</li> <li>• Training and education</li> <li>• Workplace health and safety</li> <li>• Customer health and safety</li> <li>• Poverty and community impact</li> <li>• Supply chain management</li> </ul>
Governance (G)	<ul style="list-style-type: none"> <li>• Codes of conduct and business ethics</li> <li>• Transparency and disclosure</li> <li>• Executive pay</li> <li>• Board diversity and structure</li> <li>• Bribery and corruption</li> <li>• Shareholder rights</li> </ul>

*Source: Author's compilation based on EBA report on management and supervision of ESG risks*

As is evident from above Table 1, the ESG evaluation system has three dimensions- Environmental, Social, and Governance. The environmental dimension of ESG evaluates a corporation's environmental performance in terms of carbon emissions, energy use, waste generation, and disposal, recycling efforts, adoption of innovative environment-friendly technology, spill and pollution disputes, and so on. It includes an assessment of the impact of its operations on climate and biodiversity. The social dimension of ESG evaluates a corporation's adherence to social ethics, human rights including employee rights to their health, safety, education, and training; consumer rights, donations, etc. The governance dimension of ESG evaluates its management system which encompasses matters relating to structure and diversity of the board, executive pay, related party transactions, accounting policies, internal control system, corporate disclosures, and so on.

ESG is an indicator of non-financial performance. However, there is ample research that proves that all its three dimensions individually and collectively, impact the financial performance of an entity. Thus, ESG has become a cornerstone to gain insight into the long-term performance and sustainability of an enterprise. At the same time, it has aroused the interest of scholars around the world and has become a mainstream area of research. However, to the best of the author's knowledge, there are very few studies (Gao et al. 2021; Li et al. 2021) that have done a review of existing literature on ESG. Also, these studies have mainly focussed on performance analysis and have not employed adequate science mapping tools to determine the conceptual and intellectual structure of the research field. This paper attempts to systematically review the extant literature in the field of ESG research, and synthesize it using various techniques of bibliometric analysis to find out the present status and future research directions. This will assist the scholars who are new to the ESG research field to plan their research work accordingly.

Specifically, the paper attempts to address the following questions:

**RQ1:** What is the present publication trend in the field of ESG research?

**RQ2:** Which countries, journals, authors, and studies have made a substantial contribution to the literature?

**RQ3:** Which areas of ESG are being researched presently (research trends)? and

**RQ4:** What are the directions of future research?

To achieve the above research questions, the study is organised into seven sections. Section 1 and 2 introduce the concept of ESG and justify the need for a review of existing research on it. Section 3 describes the research methodology adopted for data extraction, cleaning, and preparation. Bibliometric analysis and results are presented in section 4 while section 5 provides future research directions. Section 6 summarizes and concludes and section 7 acknowledges the limitations of the study.

### III. Research Methodology

#### 3.1 Bibliometric Software

To examine the existing research in the field of ESG, the paper employs bibliometric analysis. Bibliometrics is a science that utilizes a variety of mathematical and statistical methods to objectively analyse a given data. It affords a better and in-depth understanding of a knowledge carrier. Moreover, in case the volume

of data is large, running into hundreds to thousands of studies, bibliometric analysis is most suitable (Donthu et al., 2021). Several applications such as Citespace, Pajek, BibExcel, etc. are freely available on the web for bibliometric analysis. Each one of them has its advantages and disadvantages over the other. This study uses the biblioshiny application of R-studio software (Aria and Cuccurullo, 2017) for attaining the research objectives. The Biblioshiny application is a unique web-based tool that affords an in-depth analysis of data features, such as production trends in the field of study, most contributing countries, most prolific authors, most influential organisations, local and global citations, frequently used keywords, etc. (Moral-Munoz et al., 2020; Xie et al., 2020). It is also widely used for intelligent network mapping and for understanding the social and intellectual structure of the knowledge carrier.

**a. Database Choice**

Scopus (Elsevier), Web of Science (Thomson), and Google Scholar (Google) are the most commonly available citation databases in social sciences for bibliometric analysis. To search the academic literature in the field of ESG, the study has used the Scopus database because of its several advantages over Google Scholar and Web of Science. The use of Google scholar as a bibliometric tool has long been debated on grounds of data representation and quality. Most of the records are contained in generic domains like .com or .org meaning that most of the data come from large commercial organisations. Moreover, in some cases, there is an overrepresentation of grey scientific literature like teaching supporting materials, unpublished reports, etc. The data it provides is sometimes not comparable with other databases (Aguillo, 2012). As far as Web of Science (WoS) is concerned, its coverage is much less comprehensive in some disciplines, particularly business and management, resulting in an underestimation of citation impact (Harzing, 2010). Scopus, on the other hand, has much wider coverage. Further, 99.11% of the journals that are indexed in WoS are also indexed in Scopus (Singh et al., 2021). Thus, the inclusion of both databases for bibliometric analysis only leads to the problem of duplication that necessitates exclusion, resulting in productive loss of time and energy, when the same results could be achieved by the usage of the Scopus database alone, especially, when the data extracted from Scopus is quite large. Moreover, in case the number of papers is more than 500, WoS requires manual operations as opposed to 2000 in Scopus. Thus, the completeness and comprehensiveness of the data in Scopus led to its choice for the study.

**b. Data Extraction and Data Cleaning**

For retrieving literature in the field of ESG, this study used the search terms (2 February 2022) (“ESG” OR “ENVIRON\*SOCIAL\*GOVERN\*”) in the article title, abstract, and keywords using Boolean operators AND and OR. This means that wherever these terms appear in the title, abstract, or keywords of an article, they will be picked up for bibliometric analysis. By this process, 5946 documents were retrieved. Interestingly, it was found that the first paper on ESG was first published in the year 1990 which further reiterates that although the ESG was formally adopted in 2004 in the UN report “Who cares wins”, the concept itself was not new to the academic fraternity. The search was further refined based on the following inclusion-exclusion criteria:

1. To ensure quality, the study included only research articles that were published in journals. Alternatively stated, publications like book chapters, editorials, conference papers, reviews, notes, and similar forms of grey literature with questionable review processes have been excluded.
2. Articles published in the English language only were included to ensure understandability on the part of the researcher.
3. Subject area of interest was limited to ‘Business, Management, and Accounting’ and ‘Economics, Econometrics, and Finance’.
4. Further, only those full articles which were published till 2021 were included.

The data extraction and cleaning process is summarised as follows:

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TITLE-ABS-KEY ( ( "ESG" OR "ENVIRON*SOCIAL*GOVERN*" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) OR LIMIT-TO ( SUBJAREA , "ECON" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) ) AND ( EXCLUDE ( PUBYEAR , 2022 ) )
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After applying the above data extraction and cleaning process, the final sample consisted of 840 articles which are considered good enough for bibliometric analysis. The data was extracted in CSV format and then imported into Bibliometrix for further analysis. Figure 1 provides a view of the process.

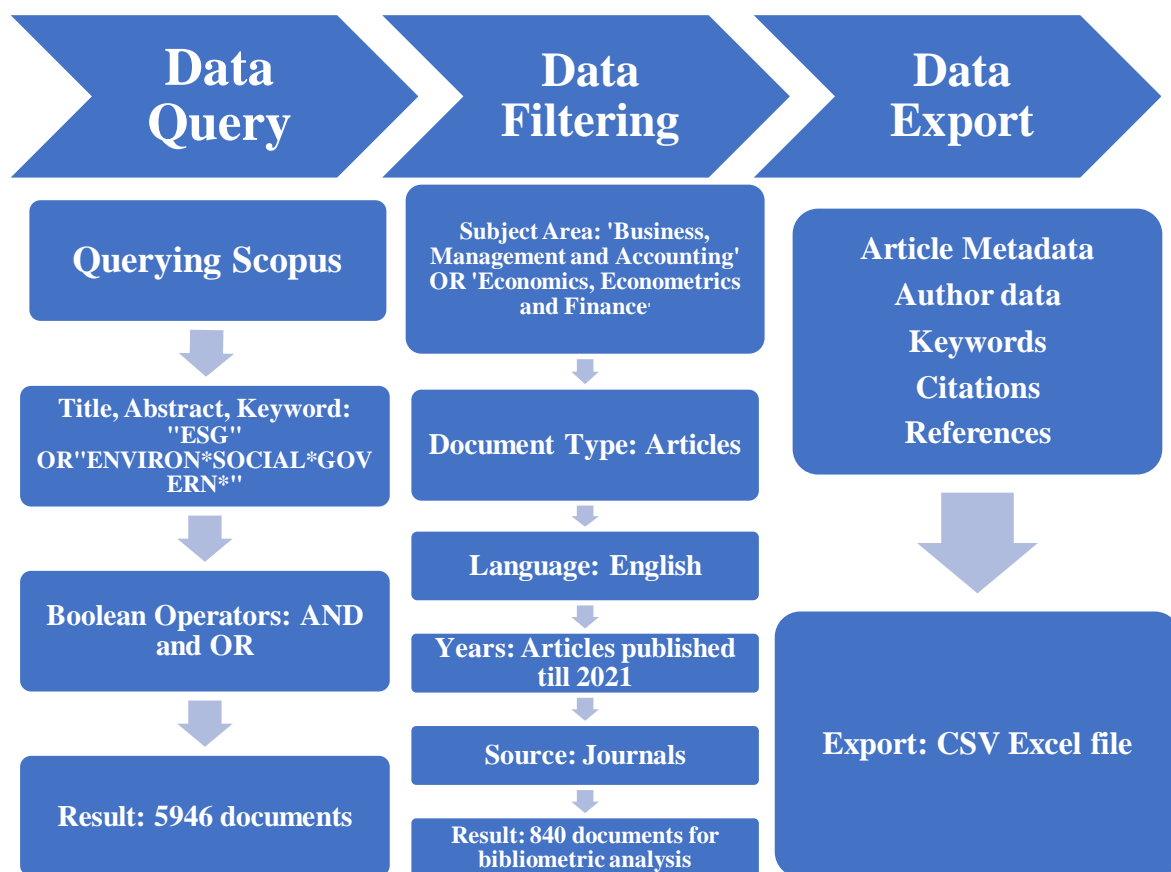


Fig 1: Data extraction and cleaning process (Author's own)

#### IV. Data Analysis

##### 4.1 Descriptive Statistics

Table 2 provides the main information about the data. It consists of 840 research articles (documents) published in 313 journals over approximately 32 years (from 1990 to 2021), indicating a lot of scope of academic work in the field of ESG.

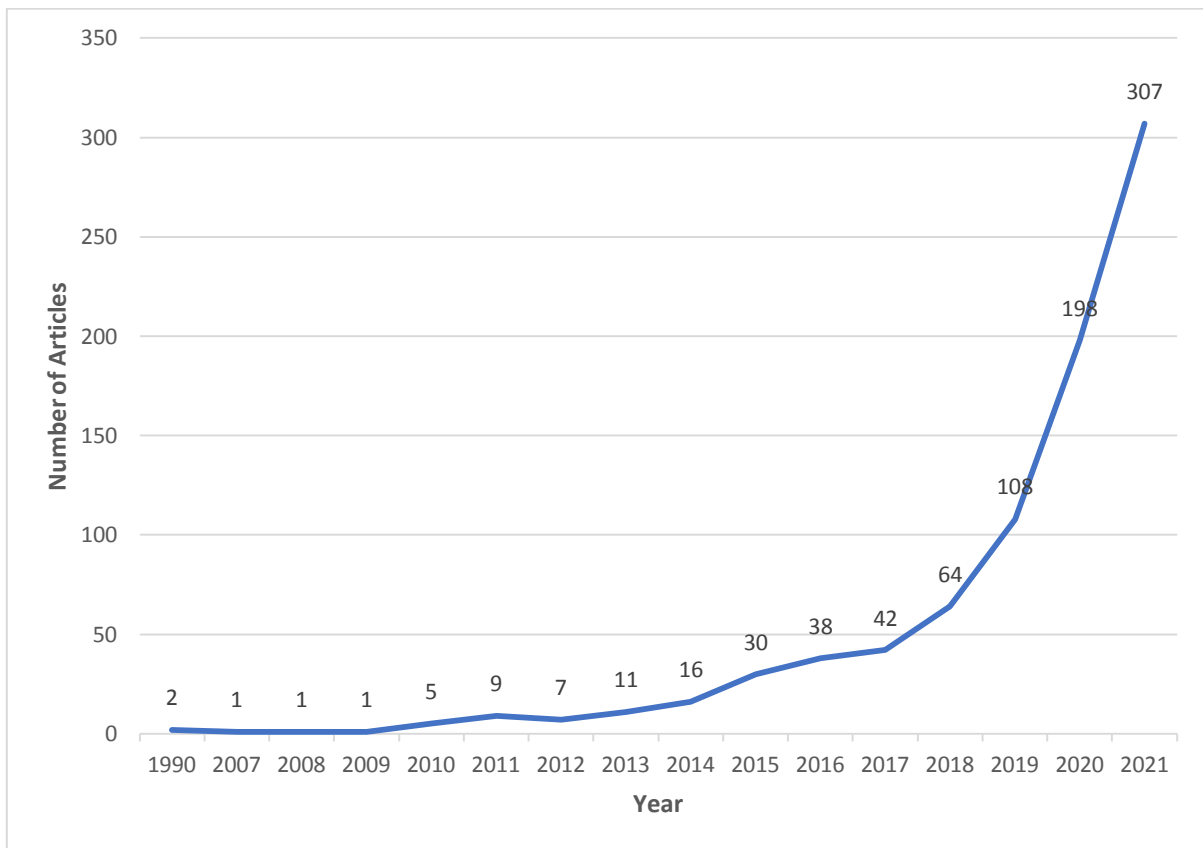
Table 2: Main information about data

Description	Results
Period	1990:2021
Sources (Journals)	313
Total number of documents(a)	840
Single Authored documents(b)	164
Multi authored documents(a-b) (c)	676
Average citations per document	15.01
Keywords Plus (ID)	714
Author's Keywords (DE)	2011
Total number of authors(d)	1815
Authors per document(d/a)	2.16
Number of authors of multi-authored documents(e)	1673
Collaboration Index(e/c)	2.47

1815 authors are working on ESG globally. The authors per document [defined as the total number of authors/total number of documents] and collaboration index [defined as authors of multi-authored documents/multi-authored documents (Elango and Rajendran, 2012; Koseoglu, 2016)] are the collaboration measures that indicate the extent of cooperation and collaboration among authors of documents. They stood at an impressive 2.16 and 2.47 respectively. This means that there is a high degree of collaboration in research on ESG. This is further substantiated by the fact that out of 840 documents only 164 (19.5%) are single-authored. The average citations per document stand at 15.01 while the average number of keywords used by authors per document is 2.39.

**4.2 Publication Trends**

Figure 2 shows publication and citation trends in the field of ESG research from 1990 to 2021. The first article captured by the Scopus database in the field of ESG emerged in 1990. Thereafter, there has not been much work on it for several years. As already discussed, although the term “Environmental, Social and Governance” was formally proposed in the year 2004 in UN Report “Who cares wins”, the concept itself was not new and was practiced as well as researched under the labels of responsible investment, sustainable investing and corporate social responsibility. This may be the reason that we do not find articles that specifically mention ESG or Environmental, Social, and Governance in their title, abstracts, or keywords. Thereafter, with the launch of the United Nations Principles of Responsible Investing in 2006, the academic work under the umbrella of ESG progressed and from 2010, as seen in Figure 2 and Table 3, there has been a steady and upward trend in the field of ESG. Moreover, the number of articles in the last three years accounts for 73% of the total number of articles published. The data, thus, reflects a growing and ever-increasing interest of scholars, researchers, and academicians in the field of ESG. Another point to be noted is the mean total citations per article which was found to be highest in the year 2014 followed by 2015, which implies that papers published in these years were highly impactful and had a major influence on research.



*Figure 2: Annual Scientific Production*

**Table 3: Publication Trends and Citations**

Year	Number of Articles	Mean Total Citations per Article
1990	2	31
2007	1	26
2008	1	23
2009	1	6
2010	5	19.60
2011	9	12.55
2012	7	8.86
2013	11	31.73
2014	16	105.37

2015	30	50.90
2016	38	35.92
2017	42	37.93
2018	64	25.11
2019	108	12.59
2020	198	9.10
2021	307	3.03

#### 4.3 Country Research Output, Impact output, and Collaboration Results

In this section, we examine the most productive and influential countries in the field of ESG research based on the number of documents and citations of these documents. We shall also attempt network analysis to find out the countries that are working in collaboration on ESG.

**Table 4: Most productive and influential countries**

Country	No. of Documents	Total Citations	Average Citation per Document
USA	317	2585	31.52
Italy	186	480	10.43
UK	157	926	19.70
Germany	115	1558	38.00
Spain	108	515	16.61
France	107	668	20.24
Australia	101	828	21.79
Canada	93	362	13.92
India	92	187	5.50
Malaysia	83	113	5.14
China	58	87	4.83
Netherlands	39	182	20.22
Japan	35	118	23.60
Romania	31	35	7.00
Ukraine	31	3	1.00
Brazil	29	217	31.00
South Africa	29	200	14.29
Poland	27	13	1.86
Sweden	27	119	13.22
Tunisia	27	10	1.67

Out of the 69 countries around the globe that have contributed to the field of ESG research, the top 20 are presented in Table 4. The list includes both developed as well as developing countries. The top five countries that have published the highest number of papers in that order are the United States, Italy, the United Kingdom, Germany, and Spain. These are all developed countries, however, the contribution of developing countries like India, China, Brazil, and Romania cannot be dismissed. For example, although Brazil lags in terms of the number of documents, the average citation per document is an impressive 31.00 which is nearly equal to that of the United States, signifying the high quality and influence of its publications. Further, a combined analysis of the number of documents and average citation per document reveals, that out of the top five countries, Germany as well as the United States farewell on both counts. These two countries are most active, both in terms of research output as well as the impact of the output. Barring these two countries, we found that a more productive country may not be a more impactful country.

To gain deeper insight, we examine collaborative efforts among countries on the basis of network analysis (Figure 3). By application of a minimum number of edges to 2, five clusters emerged. It was found that almost all the top 20 countries are working in collaboration with each other, the highest being the United States followed by the United Kingdom. In cluster 1, the United States, United Kingdom, Italy, Italy, Canada, China, and the Netherlands are working in close association as compared with South Africa, Poland, Korea, Bahrain, and Hungary. The network analysis has brought about another interesting fact about Brazil. Despite producing highly impactful research in the field of ESG, as evidenced by its average citations per document, the country's collaborative efforts are negligible. Hence, the study sees a huge opportunity for researchers of this country to work in collaboration to enhance its research output. As far as India is concerned, a combined analysis of research output, impact, and collaboration brings out a dismal picture. Although Indian researchers are active in the field of ESG, its impact and influence (average citation per document=5.50) are not encouraging. India is collaborating broadly with Romania only whose performance in itself is average at best. We, therefore, suggest more collaborative efforts on the part of India in the ESG research field.

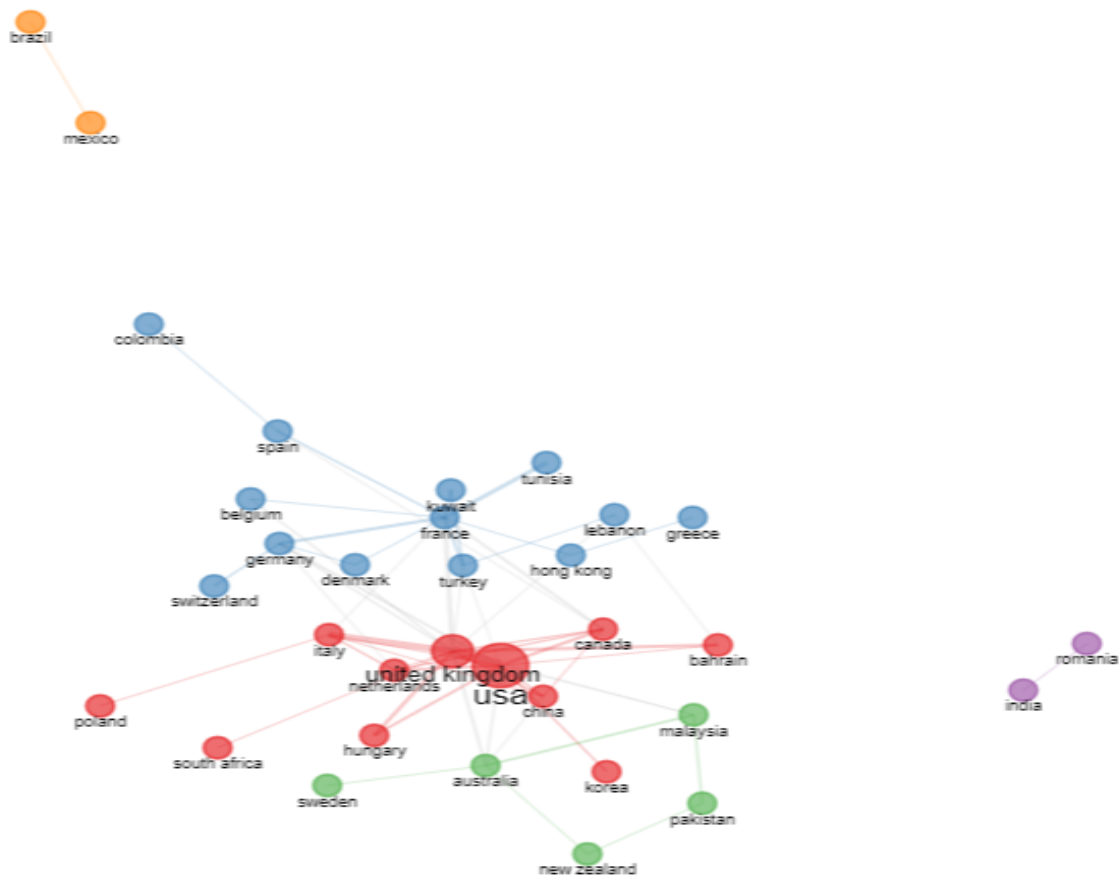


Figure 3: Collaboration network among countries

**4.4 Journal performances**

Table 5 provides information about the 20 most productive journals based on the number of publications and we find that the Journal of Sustainable Finance and Investment tops the list followed by the Journal of Business Strategy and the Environment and Corporate Social Responsibility and Environmental Management. This is expected as the core theme of these journals are sustainable finance, environment, and corporate social responsibility. Figure 4 is a visual of Bradford’s law of scattering, which simply put, means that few sources have relevant information about a topic. This law is useful in bibliometric analysis and library sciences. Of the 840 documents, almost 33% are found in 11 top journals.

The most productive journals, however, were not necessarily found to be most impactful. We have used Cite Score as a quality parameter of a journal. There are other methods to examine a journal including total citations, impact factor, etc, none of them, to the best of the author’s knowledge superior to another. Journal of cleaner production tops the list as the most impactful of the productive journals, followed by Business strategy and environment and Journal of Business ethics. Since Bibliometric analysis is also a tool that can be used by researchers for the selection of journals for possible publication of their papers, Business Strategy and environment is an appropriate choice since it ranks well both in terms of productivity and quality.

**Table 5: Most productive and influential Journals**

Sources	No. of Articles	Cite Score
Journal of Sustainable Finance and Investment	59	2.4
Business Strategy and the Environment	39	10.3
Corporate Social Responsibility and Environmental Management	30	8.0
Journal of Business Ethics	30	9.0
Journal of Portfolio Management	28	1.5
Journal of Cleaner Production	20	13.1
Finance Research Letters	19	5.3
Journal of Asset Management	17	1.0
Sustainability Accounting Management and Policy Journal	14	3.6
Journal of Investing	12	0.4
Journal of Corporate Finance	10	4.9
Accounting and Finance	9	3.3

Corporate Governance (Bingley)	9	4.1
Meditari Accountancy Research	9	5.2
Social Responsibility Journal	9	3.5
Financial Analysts Journal	7	3.3
Journal of Business Research	7	N/A
Journal of Index Investing	7	0.3
Research in International Business and Finance	7	4.9

## Bradford's Law

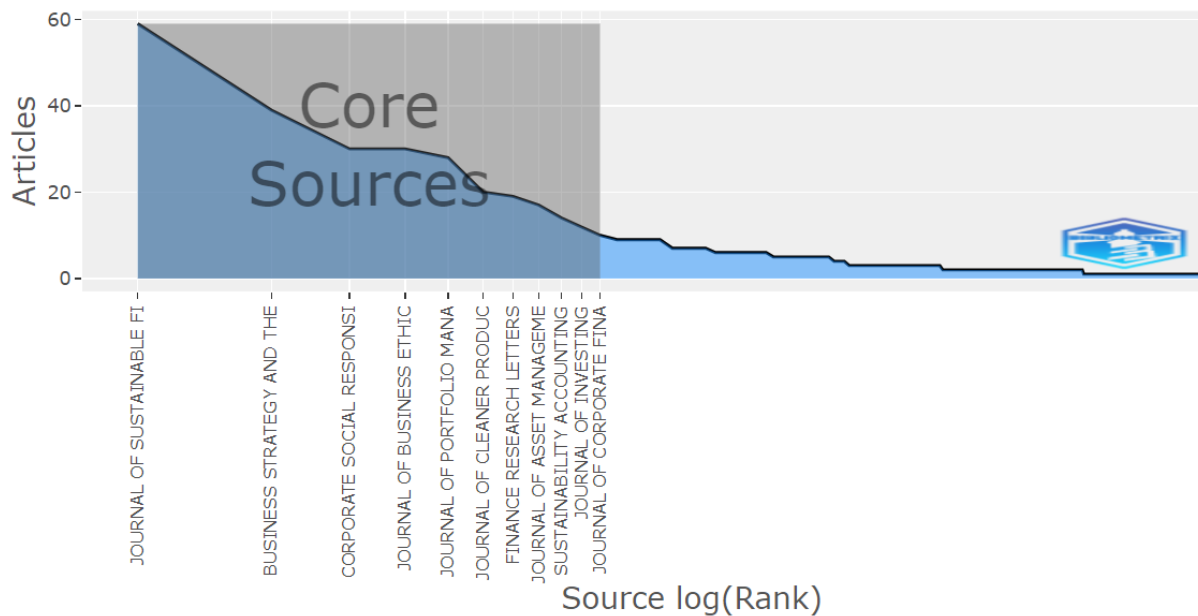


Figure 4: Bradford's Law

### 4.5 Author Influence

This section examines the most prolific and impactful authors in the field of ESG research. Authors' impact has been calculated on the basis of total citations received for documents instead of other measures like H-index, M-index, etc. Results are presented in Table 6.

Table 6: Authors' influence

Authors	Articles	Total Citations	Average Citations per Document	Publication start year
Buallay A	8	82	10.3	2019
Dorfleitner G	6	187	31.2	2015
Utz S	6	71	11.8	2014
Crifo P	5	143	28.6	2015
Gao Y	5	3	0.6	2020
Giese G	5	38	7.6	2019
Lee L-E	5	57	11.4	2019
Nagy Z	5	38	7.6	2019
Rezaee Z	5	214	42.8	2015
Velte P	5	157	31.4	2016
Bodhanwala R	4	36	9.0	2018
Bodhanwala S	4	36	9.0	2018
Chouaibi S	4	23	5.8	2021
Eccles RG	4	66	16.5	2019
Escrig-Olmedo E	4	130	32.5	2013
Giamporcaro S	4	13	3.3	2012
Hamdan A	4	41	10.3	2020
Hebb T	4	61	15.3	2010
Rajesh R	4	78	19.5	2020
Revelli C	4	63	15.8	2015

A perusal of Table 6 reveals that Buallay A is the most prolific author with 8 papers to his credit. An analysis of Scopus data reveals that his first paper "Between cost and value: investigating the effects of



sustainability reporting on a firm’s performance” (Buallay, A., 2019) was published in the Journal of Applied Accounting Research in 2019. In just 3 years, his contribution to the ESG field has been commendable. His papers revolve around sustainability reporting and its linkages with financial performance in the agriculture, banking, and tourism sector (Buallay, A., 2021; Buallay et al., 2021), etc. However, he is not the most impactful (ACPD=10.3), maybe owing to his recent foray into the ESG research field.

Out of the top 20 most productive authors, Rezaee Z is the most influential (ACPD= 42.8). His first paper “Business sustainability performance and cost of equity capital” (Ng, A.C., & Rezaee, Z., 2015) was published in the Journal of Corporate Finance in 2015. It is his most cited paper and has been cited 102 times. He has focussed his research on sustainability disclosures, corporate social responsibility, non-financial information (Rezaee, Z., 2019, Rezaee, Z. et al., 2016), etc which are considered synonymous terms with ESG. Rezaee, Z is followed by Escrig-Olmedo E and Velte, P.

Thus, in general, we find that the most productive authors are not the most impactful. To gain a deeper insight, we refer to Figure 5, which depicts the authors’ production and citation over time. Horizontal bars exhibit the active years of authors, while bubble represents the number of articles, and the colour of bubbles reflects their citations. We infer that majority of the productive and impactful authors have been active for comparatively more years. This may be one of the causes of high citations for these authors. For a budding researcher, the publications of Rezaee, Z, Escrig-olmedo E and Velte P are a must read.

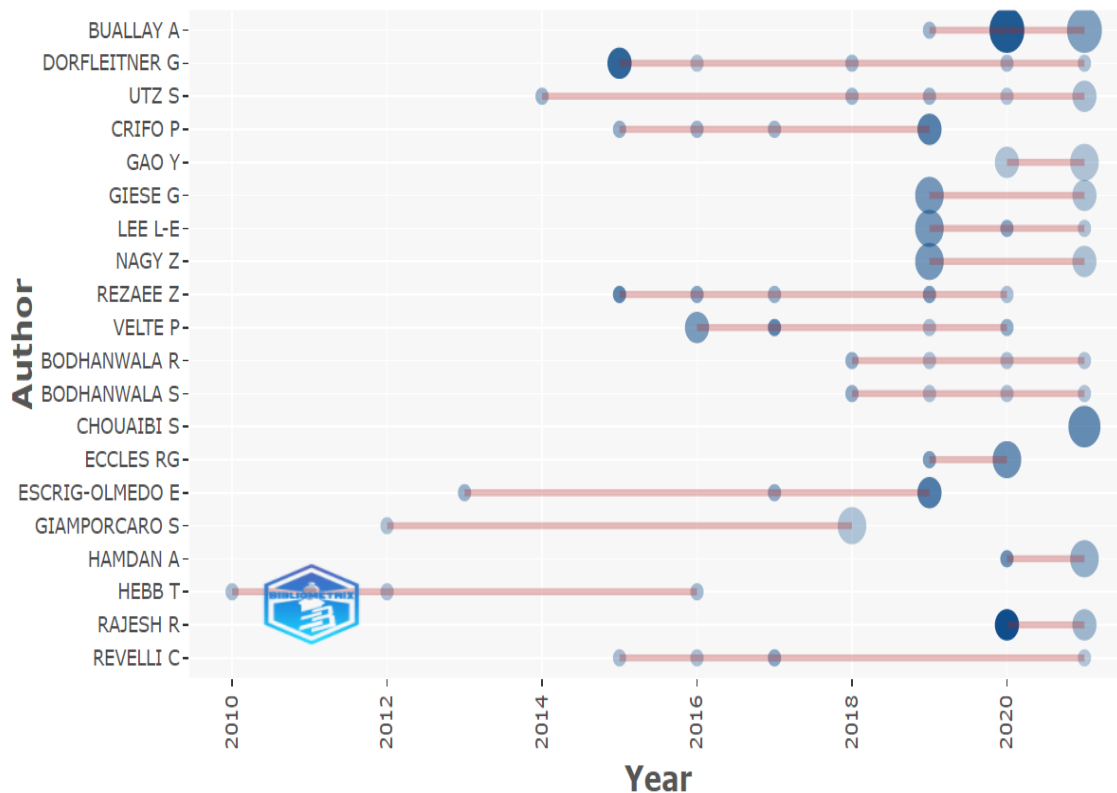


Figure 5: Authors’ production over time

#### 4.6 Most influential Documents

Citation analysis is a bibliometric technique that helps in identifying the documents that had a major impact in the field of specified research. These documents are cited most frequently by other researchers in the same field. While in global citation analysis, the total citations received by a document is considered, in local citation analysis, the stress is on citations within a particular dataset (e.g., 840 documents here). Table 7 exhibits the most influential documents on ESG on the basis of local citations.

Table 7: Top 10 documents by local citations

S.No.	Title	Author (year)	Journal	Local Citations	Global Citations
1.	ESG and financial performance: aggregated evidence from more than 2000 empirical studies.	Friede et al. (2015)	Journal of Sustainable Finance and Investment	123	407
2.	Corporate social responsibility and access to	Cheng et al. (2014)	Strategic	90	987

	finance		Management Journal		
3.	ESG Integration and the Investment Management Process: Fundamental Investing Reinvented	Van et al. (2016)	Journal of Business Ethics	42	105
4.	ESG in Focus: The Australian Evidence	Galbreath, J. (2013).	Journal of Business Ethics	41	85
5.	Socially responsible funds and market crises	Nofsinger et al. (2014)	Journal of Banking & Finance	38	176
6.	Corporate social responsibility and financial performance: A non-linear and disaggregated approach	Nollet et al. (2016)	Economic Modelling	35	143
7.	Why and How Investors Use ESG Information: Evidence from a Global Survey	Amel et al. (2018)	Financial Analysts Journal	33	120
8.	Does ESG performance have an impact on financial performance? Evidence from Germany	Velte P. (2017)	Journal of Global Responsibility	29	77
9.	Sensitive industries produce better ESG performance: Evidence from emerging markets	Garcia et al. (2017)	Journal of cleaner production	29	96
10.	ESG performance and firm value: The moderating role of disclosure	Fatemi et al. (2018)	Global Finance Journal	27	140

The paper ‘ESG and financial performance: aggregated evidence from more than 2000 empirical studies’ by Friede et al. (2015), published in the Journal of Sustainable Finance and Investment is the most locally cited paper. It investigated the relationship between environmental, social, and governance (ESG) criteria and corporate financial performance (CFP) by combining the findings of about 2200 individual studies and found a positive and stable impact of ESG on CFP. This is followed by the paper ‘Corporate social responsibility and access to finance’ by Cheng et al. (2014), published in Strategic Management Journal which incidentally is the most globally cited paper. The paper explores whether superior CSR performance results in better access to finance because of reduced agency costs and information asymmetry. It found that firms with superior CSR performance face significantly lower capital constraints.

Most of the highly cited papers focus on the perceived consequences arising out of ESG practices by a firm. ESG has been linked with financial performance, firm value, access to finance, investment, etc. Another interesting fact is the intertwined nature of literature on corporate social responsibility and ESG. Most of the highly cited research in the field of ESG was undertaken after 2013, indicating ample scope for future research.

#### 4.7 Most frequently used keywords

A word cloud is a visualization technique for highlighting the frequency of keywords in a dataset. The size of a keyword is a representation of the frequency with which it appears. The 40 most commonly used author’s keywords are presented through word cloud in Figure 6. Predictably, ESG is the most frequently used keyword appearing 190 times, followed by corporate governance, environmental, and sustainability. These keywords are most commonly used in the document as keywords by authors.



Figure 6: World cloud of the keywords used in ESG research

Word cloud is used to identify the most significant and impactful keyword on a topic and provides a fair view of the research themes. When combined with other mapping and enrichment techniques like thematic mapping, it can be an invaluable tool for bibliometric analysis.

#### 4.8 Trends in ESG Research

This section attempts to analyse the trends of keywords used by authors over the years to understand the evolution of ESG research. Trend analysis of a research field can be an invaluable method to understand the research emphasis in the past which can then be used, in combination with other techniques like thematic mapping to predict future research directions. The graphical parameters are set as minimum word frequency per year at 6 and number of words per year at 5, meaning a maximum of 5 keywords that appear a minimum of 6 times. The results are presented in Figure 7. Years are presented on the abscissa, while ordinate presents the keyword. The bar length and node size represent the breadth of a research topic and the year of extensive research in the field, respectively.

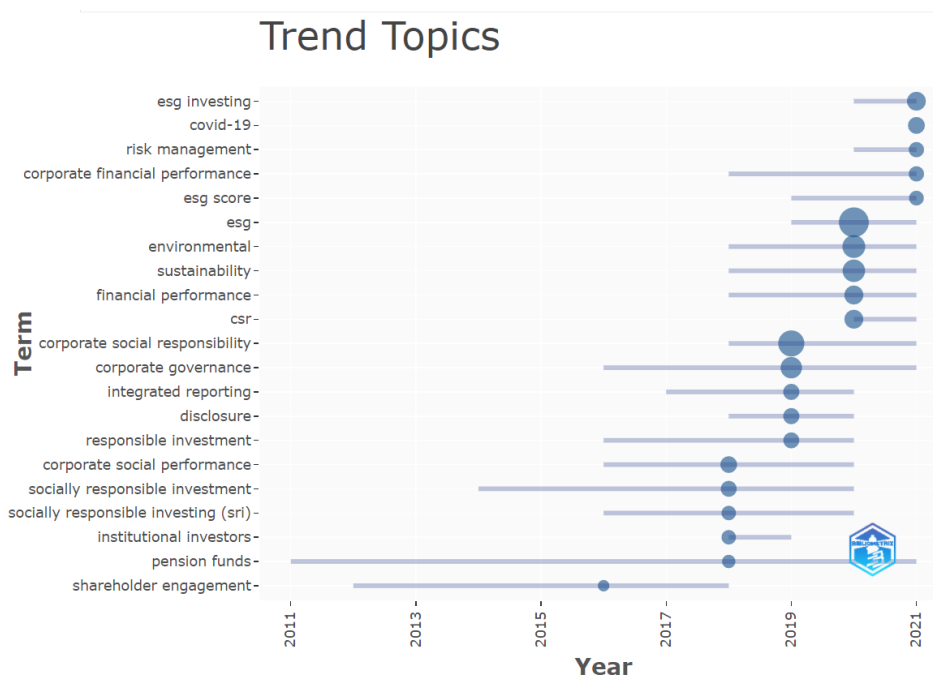


Figure 7: ESG research trends

Extensive research in the field of ESG accelerated from 2011 onwards with the paper “Relative performance evaluation and pension investment management: A challenge for ESG investing” (Himick D, 2011) published in the Critical Perspectives on Accounting. This dimension of ESG has retained its popularity as can be seen from the length of the bar. People invest in pension funds to earn stable returns. The research focus is thus on if and how responsible investing can achieve the objectives of pension funds. In 2018 we see extensive research on ESG under the umbrella of socially responsible investment and corporate social performance. The focus of research in 2019 was on disclosure and integrated reporting among others. Corporate governance and corporate social responsibility have been extensively researched since 2016 and continue to spark interest. At present, ESG investing has become a trending hotspot and we see a lot of research here. With the penetration of ESG products like mutual funds, this area is expected to see vigorous research in the future too. Evaluation of ESG performance of a company as evidenced by ESG scores is vital in ESG investing and therefore research is being undertaken in this field too. Thus, to be best of the author’s judgment, ESG investing, ESG scoring (rating) systems and ESG linkage with corporate financial performance will be future research hotspots. Thematic mapping in the proceeding section strengthens and extends these predictions.

#### 4.9 Thematic mapping

The goal of thematic mapping is to identify themes in textual data. “Thematic map is a very intuitive plot and we can analyze themes according to the quadrant in which they are placed” (Aria & Cuccurullo, 2018). Themes are formed on the basis of keywords, titles, or abstracts. In this two-dimensional graph, themes are classified on the basis of density and centrality. The X-axis represents the centrality which is a measure of relevance or importance of a theme. The density which represents the stage of development of a theme is plotted

on Y-axis. Measures of central tendency like mean and median are employed to access the centrality and density of a research theme. On this basis, themes are classified and placed in four quadrants (Figure 8) which are-

(1) *Upper-right quadrant(Q1)*: Motor-themes. These themes are high density and high centrality themes, meaning thereby, they are essential and well developed. ‘Corporate Social Responsibility’ (CSR) and its synonym ESG, ‘Corporate Governance’ and ‘Sustainability’ are placed in this quadrant. ESG evolved out of CSR and to date these two terms are used interchangeably, though there are perceptible differences between the two. While CSR refers to the consideration of social, environmental and governance ethics and is a qualitative concept, ESG broadly focuses on the measurement of these considerations on the basis of set parameters and weights. Application scenarios of CSR are much wider and cover supply chain management, community communication, etc whereas ESG mainly focuses on investors, ratings, scores, and consequently capital markets. Since themes in this quadrant are well developed and extensively researched, they are excellent for systematic literature review and bibliometric studies.

(2) *Lower-right quadrant(Q2)*: Basic themes. This is a high centrality-low density quadrant, meaning themes in this quadrant are significant but not adequately developed. Themes in this quadrant are- ‘Environmental’, ‘Social’ and ‘ESG investing’. Environmental and social are the important themes that are continuously being developed in the light of newer and newer climate and social challenges. Further, ESG investing has lately gained a lot of importance as we see numerous ESG-based assets nowadays. However, as exhibited in the prior section, it is not an adequately developed field of ESG research and extensive research on it started in 2020 only.

(3) *Lower-left quadrant (Q3)*: Emerging or disappearing themes. These themes are weakly developed and emerging and therefore are suitable for future research. ‘ESG disclosures’, ‘ESG ratings’, and the ‘impact of a corporate’s ESG performance on its financial performance’ are prominent here.

(4) *Upper-left quadrant (Q4)*: Very specialized/niche themes. This is a high-density-low centrality quadrant. Themes like ‘event study’ are highly developed themes but in relation to ESG remain isolated due to a low level of centrality.

The study has adopted the authors’ keywords and parameters as Number of words-250 and Minimum Cluster frequency (per thousand documents)-5.

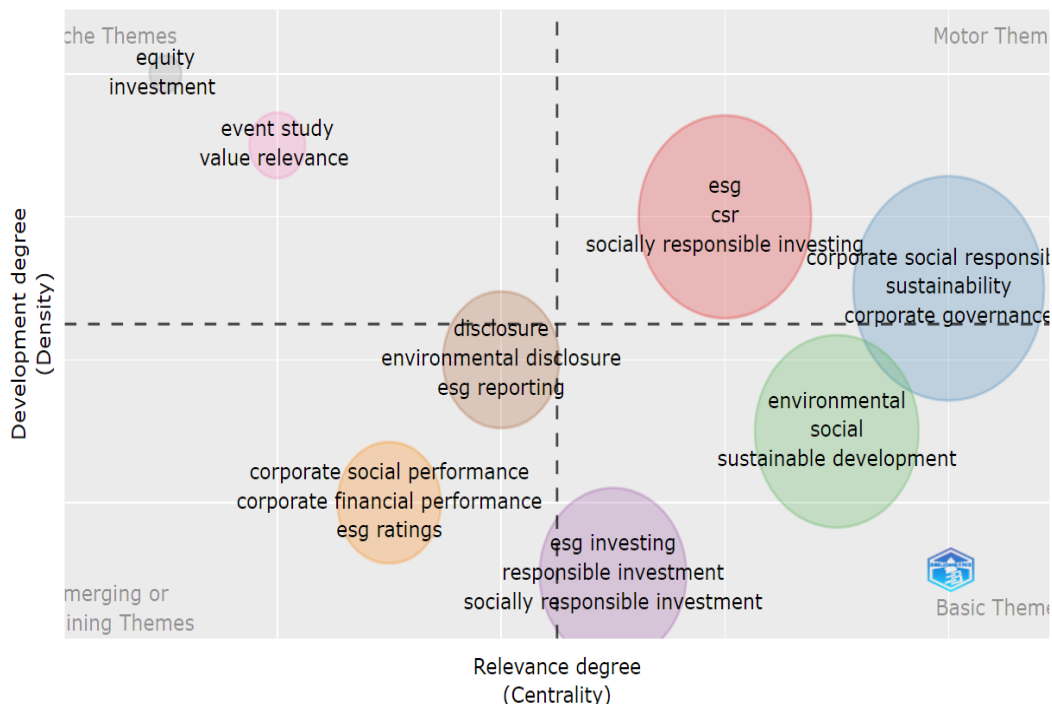


Figure 8: Thematic mapping

## V. Future research directions

Based on prior research trends and thematic mapping, the study proposes the future scope of research in ESG as follows:

(1) **ESG disclosures**: refer to communication by a corporate about environmental, social, and governance aspects of its operations. “Amongst the many dramatic changes that the business world witnessed since the 1990s, the rise of ESG reporting agenda is certainly one of the most noteworthy” (Francis et al., 2008). KPMG

in its International Survey on Corporate Responsibility Reporting (2011) found that 95% of the 250 world's largest companies disclose non-financial information in one way or another. However, the ESG reporting practices are imbalanced globally. Although in many countries ESG disclosure is mandatory, it is hot of debate among academicians, corporate managers, environmentalists, etc on two counts:-

- i) Mandatory Vs. voluntary disclosure: i.e., whether ESG disclosures should be voluntarily adopted by corporates or mandatorily imposed by regulation? and
- ii) Framework of ESG reports: The recommended structure of Integrated Reports has kept on changing over the years and is not universally applicable across nations and industries. Thus, there is a lot of scope for research in this subdomain of ESG.

(2) **ESG ratings:** ESG ratings play a significant role in the financial decision-making process. With ESG investing becoming a norm in the future as evidenced by the proliferation of numerous ESG-based products in the market, the need for a unified ESG evaluation system will rise in the future. At present, the rating agencies and professional investors evaluate the ESG performance by utilising the data from Thomson Reuters Asset4 or Bloomberg MSCI databases each one of which has its own evaluation methodology and limitations in terms of coverage of companies, etc. In the absence of a universal and unified system for ESG evaluation, a company may have different ESG ratings for the same period. The establishment of unified ESG disclosure and scoring criteria are the topics that are worthy of research in the future.

(3) **Impact of ESG performance on financial performance:** Whether and to what extent ESG performance influences a corporate's financial performance is a matter of debate. Empirical evidence of the impact is inconclusive and still emerging. While some studies have deduced that good ESG performance results in competitive advantages, a better brand image resulting in customer patronage, and improved market value and profitability (Laskar and Maji 2017; Andersen and Dejoy 2011; Waddock and Graves 1997), others have found no association and some even negative or mixed association (Henderson, 2001; Reich, 2008). Some studies have found that the social dimension has more impact as compared to the environmental dimension. The study sees a scope of research here.

## **VI. Summary and conclusions**

Given the global focus on environmental, social, and governance aspects of corporate sustainability, the present study was undertaken to provide a holistic picture of ESG research through bibliometric analysis. A total of 840 documents were retrieved from the Scopus database for the period 1990-2021 post-application of inclusion-exclusion criteria and were analysed using the bibliometric tool- Biblioshiny of R-studio software. Through performance analysis, citation analysis, trend analysis, and thematic mapping, the study was able to identify publication trends, influential countries, journals, authors, and studies that have made substantial contributions in the field of ESG research. Based on the present research status, the study provides invaluable suggestions for future research in the field of ESG.

ESG was formally proposed in the year 2004 in UN Report "Who cares wins". The research on ESG is still growing and the study found extensive and exponential research on ESG in the last four years.

Out of 69 countries engaged in the field of ESG research, the United States (317), Italy (186), the United Kingdom (157), and Germany (115) top the list of most productive countries on the basis of the number of documents. However, a more productive country may not be a more impactful country. Germany emerged as the most cited country with the highest average citation per document (38) followed by the United States (31.52), Brazil (31), and Japan (23.60) respectively.

Collaborative world map indicated that most of the developed countries are working in close collaboration with each other. As far as India is concerned, both the research impact and collaboration index are dismal which afford a lot of scope to Indian researchers.

On the basis of the number of documents Journal of sustainable finance and investment (59), Business strategy and the environment (39), and Corporate social responsibility and environmental management (30) emerged as the topmost journals contributing significantly to the body of knowledge on ESG. On the basis of impact as measured by Citescore, Journal of Cleaner Production (13.1) topped the list followed by Business Strategy and the Environment (10.3) and Journal of Business Ethics (9). Since Bibliometric analysis is also a tool that can be used by researchers for the selection of journals for possible publication of their papers, Business Strategy and Environment was found to be an appropriate choice since it ranked well both in terms of productivity (39) and impact (10.3).

Application of Bradford's law revealed that of the 840 documents, almost 33% were clustered in zone 1 i.e., highly productive zone, consisting of 11 journals.

On the basis of the number of documents, Buallay A (8), Dorfleitner G (6), and Utz S (6) were found to be the most prolific authors while the results of citation analysis reveal Rezaee Z to be the most influential (Average citation per document=42.8). Analysis of authors' production over time reveals that the majority of the productive and impactful authors were active in research for comparatively more years.

Document citation analysis revealed "ESG and financial performance: aggregated evidence from more than 2000 empirical studies" by Friede et al. (2015) and "Corporate social responsibility and access to finance" by Cheng et al. (2014) to be the most impactful documents on the basis of local and global citations respectively and are a must-read for researchers.

Word cloud visualization revealed ESG to be the most frequently used keyword appearing 190 times, followed by corporate governance, environmental, and sustainability. These are the core terms associated with ESG.

Bibliometric analysis is an invaluable tool that assists researchers in understanding the research themes and research gaps. It provides guidance for future research. The study employs 'thematic mapping' of Biblioshiny for this purpose. The research themes identified were:

CSR, Corporate Governance and Sustainability: Motor themes

Environmental, Social, and ESG investing: Basic themes.

Event study: Niche theme.

The most important contribution of a bibliometric study is to provide future research agenda. Based on trend analysis and thematic mapping, the study concluded that future research can be undertaken under the domains of ESG disclosures, ESG ratings, and the impact of a corporate's ESG performance on its financial performance.

## VII. Limitations

The study has collected data from the Scopus database because of its comprehensive coverage and also to avoid duplication. However, there is a chance that some important studies contained in other databases like Web of Science and Google scholar may have been missed. Moreover, the study includes a review of only research articles published in the English language. Finally, the study used the Biblioshiny tool of the R package for analysis. Other tools like VOSviewer, Citespace, etc may also be used in further bibliometric studies to better represent the visualizations and networks.

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