



GREEN ENTREPRENEURSHIP RESEARCH OUTPUT IN INDIA (2010-2024): A SCIENTOMETRICS ANALYSIS AND EXPLORATION

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Abstract:

This review examines the evolution of Green Entrepreneurship research in India between 2010 and 2024, focusing on growth patterns, collaborative networks, and thematic trends. Utilizing a scientometric framework with tools like VOS viewer and statistical analysis, the study explores key bibliometric indicators including publication trends, authorship collaboration, keyword co-occurrence, and international linkages. The findings indicate a steady increase in scholarly output with a growth rate of 0.58 and a literature doubling time of 1.80 years. A dominant trend of multi-authored publications is evident, with 90% of the research produced by two or more authors. The collaborative index varied over the years, peaking at 4.22 in 2022, while the mean collaborative coefficient was 0.54. Keyword analysis revealed "sustainability" as the most frequently occurring term, demonstrating its centrality to the field. The largest co-authorship network included 685 researchers, with Kumar S identified as the most prolific contributor. Institutional analysis showed involvement from over 13,900 organizations, with 126 forming robust collaborative clusters. Notably, India exhibited strong bibliographic coupling with the United Kingdom, indicating significant cross-national research ties and citation impact. The review concludes that Green Entrepreneurship research in India is experiencing sustained growth, characterized by high collaboration, a strong sustainability focus, and meaningful international partnerships. These findings provide critical insights for shaping future research agendas and policy frameworks in sustainable entrepreneurship.

Key Words: Green Entrepreneurship, Scientometric Analysis, Collaboration Index, Bibliographic Coupling and Sustainability.

1. Introduction:

The term green entrepreneur brings together the notions of entrepreneurship with environmental responsibility. It embodies key entrepreneurial traits such as innovation, risk-taking, and new business ideas, combined with a strong commitment to social and ecological sustainability. This study focuses on green entrepreneurial initiatives and the promotion of eco-friendly products. Green entrepreneurs are dedicated to developing sustainable products while minimizing pollution. Their efforts aim to encourage new entrepreneurs to adopt environmentally friendly practices by producing green products. The growing awareness of environmental issues and sustainability has profoundly influenced entrepreneurial activities, leading to the emergence of "green entrepreneurship." Also known as eco-entrepreneurs, these individuals integrate environmental and social considerations into their business models, striving to address ecological challenges while creating economic value. Beyond profitability, they prioritize reducing environmental harm, promoting sustainable practices, and driving eco-friendly innovation.

The term green entrepreneur refers to the mix of entrepreneurship and the environment. The green entrepreneur cultivates green businesses using green techniques. A green entrepreneur actively addresses an environmental or social issue/need by understanding business concepts. They enter the market by replacing conventional or traditional items. The green entrepreneur's goal is to raise awareness of the green ecosystem while simultaneously providing green products or services to customers. So, the notion for green entrepreneurship comes from a mix of the primary qualities of entrepreneurship itself - creativity, risk, a brand-new business idea, and the social and ecological engagement of individuals who do business. The 1960 effort of becoming green represents the recycling of numerous social movements aimed at improving the environment. Identifying market prospects is one of the first tasks for a new green entrepreneur when starting a business. This talent, known as opportunity recognition, entails identifying the need for new technology, services, or products that address sustainability issues. From a development standpoint, "Green entrepreneurship" is a gradually appropriate phenomenon that is still relatively under-researched. While global inequality and rising unemployment present significant challenges for policymakers, the emerging effects of climate change and rapid biodiversity loss, combined with widespread destruction of wildlife and natural habitats, increase the vulnerability of already overburdened social groups and ecosystems. Green entrepreneurship has a big impact on employment creation. Furthermore, the type and factors of innovation have a significant impact on technological advancement and variation. The modern advancement of worldwide economic procedures has substantially affected the old ways used by businesses to develop. Despite impressive breakthroughs in environmental accounting and reporting, as well as technical research and implementation, the gap towards sustainability remains large.

Croston 2008 defined green business that "Green Businesses have more sustainable business practices than competitors, benefiting natural systems and helping people live well today and tomorrow while making money and contributing to the economy" This study examines green entrepreneurship in India, focusing on initiatives taken by green entrepreneurs in developing and promoting eco-friendly products. These entrepreneurs are committed to sustainability and minimizing pollution levels.

Furthermore, their efforts inspire and encourage young entrepreneurs to build environmentally conscious businesses, which are particularly crucial for India, where pollution levels continue to rise. Pernick and Wilder defined "sustainable" as "any product, service, or process that delivers value using limited or zero nonrenewable resources and/or creates significantly less waste than conventional offerings." They focus on eight important clean technology sectors: solar, wind, biofuels, green building, personal mobility, the smart grid, mobile apps, and water filtration.

2. Scope of the Study:

This study aims to conduct a scientometric analysis of green entrepreneurship during the period from 2021 to 2024, exploring the academic and research output within this timeframe. By analyzing key metrics such as publication trends, citation networks, authorship patterns, and keyword co-occurrences, this research seeks to uncover the dynamic developments, emerging themes, and potential future directions in the domain of green entrepreneurship. The findings from this analysis will contribute to a deeper understanding of how green entrepreneurship has evolved in response to the global push for sustainability and its growing significance in the modern business landscape.

3. Objectives:

The primary objectives of this scientometric analysis of green entrepreneurship during the period from 2021 to 2024 are as follows:

- To investigate the increase of publication in the subject of green entrepreneurs during the time.
- To calculate the authorship pattern in the field of green entrepreneurs
- To investigate the emerging trends in green entrepreneur's research output by analyzing the bibliographic coupling and keyword co-occurrences in the field.
- To describe the geographical distribution of the research on green entrepreneurship.
- To evaluate the impact and influence of research publications through citation analysis, most highly cited papers and significant contributions that have shaped the direction of green entrepreneurship research.

4. Limitation of the Study:

This study is limited to data retrieved from Elsevier's Scopus database for the period from 2010 to 2024. The analysis is based solely on publications indexed in Scopus, which may exclude relevant studies available in other databases such as Web of Science, Google Scholar, or non-indexed sources. Furthermore, the search strategy relied on the keyword "green entrepreneurship" applied across title, abstract, author keywords, and all fields. As a result, studies using alternative or related terminologies may not have been captured. A total of 6,089 documents were retrieved, focusing on research output related to green entrepreneurship, particularly with reference to India. These limitations may affect the comprehensiveness and generalizability of the findings.

5. Literature Review:

Anilkumar and Prabha Kiran 2017 analyzed the Green Entrepreneurship database from Scopus, covering 88 publications during the period 2005-2016. These articles reveal patterns in authorship, highly cited works, publication sources, author productivity, and the regions contributing the most articles. The study observes that the highest number of publications involve dual authors, with the United States contributing the most articles across various subject.

Deepa Guleria and Gurminder Kaur 2021 conducted a bibliometric analysis of 216 documents from the Web of Science database (1989-2019) using VOS Viewer. Their study explored co-authorship, citation networks, keyword co-occurrence, and bibliographic coupling. Of the 216 documents, 176 were selected for citation analysis, with 154 forming a connected network. The study identified the USA, England, the Netherlands, and Germany as the leading contributors. Keywords such as "sustainability," "sustainable entrepreneurship," and "sustainable development" exhibited the highest co-occurrence. Among 647 keywords, 13.91% appeared twice, 6.64% three times, and 3.24% four times, with an average citation score of 14 and total link strength of 82.

Ashari Gunawan and Fadli AgusTriansyah 2024 analyzed research trends on green entrepreneurship using Scopus data from 2002 to 2024, documenting 94 publications. The study reveals fluctuating publication rates, peaking in 2023 with 24 documents. Key contributors include D. Gibbs, with the highest number of publications, highlighting their significant role in advancing the field. The United Kingdom leads with 18 documents, highlighting its prominent contribution to green entrepreneurship research. Keyword analysis underscores the centrality of green entrepreneurship, along with related terms like green entrepreneurs and green business.

Amousa, Fatemeh et al. 2024 reveals 171 databases collected from green entrepreneurship for the year 2000-2022. it highlights the growing significance of green entrepreneurship research driven by societal needs, resource scarcity, and environmental challenges. It underscores the dominance of developed nations like the U.S., England, and China in this field and the prevalence of traditional entrepreneurship theories adapted for green contexts. The findings revealed that England and China have the highest co-authorship in green entrepreneurship studies. The findings for individual quantitative and qualitative methods over mixed methods, emphasizing the need for institutional reforms to support green business initiatives. This research provides valuable insights into existing gaps, offering guidance for future studies and aiding policymakers in promoting sustainable development.

Aswathy Sreenivasan and Suresh M. conducted a bibliometric study analyzing 1,357 publications on sustainable entrepreneurship from 2002 to 2022. Their findings highlight sustainable entrepreneurship as a driving force for social, environmental, and economic transformation. The study recorded the highest publication output in 2022 with 304 documents and the highest total citations at 5,790. The most cited article, Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions, received 963 citations, authored by the most prolific contributors Schaltegger and Wagner. Using co-word analysis, scientific mapping, and bibliographic coupling, the study identified key thematic areas and influential sources shaping the field.

6. Research Design:

This study employs a bibliometric analysis research design to evaluate the scholarly landscape of green entrepreneurship. The Scopus database served as the primary data source, with relevant literature retrieved using the keyword green entrepreneurship. A combination of quantitative bibliometric indicators and network visualization techniques was used to assess the growth, collaboration, and research impact in the field. The study utilizes Mahapatra's 1985 relative growth rate (RGR) and doubling time (DT) model to measure the progression of scholarly output. Additionally, collaborative research trends were examined using Lawani's Collaboration Index (CI) and Ajiferuke et al 1988 Degree of Collaboration (DC), which provides a refined measure of research cooperation by eliminating weight for single-author publications. The study also incorporates the Coefficient of Collaboration (CC) Subramanyam 1983 and Savanur, Kiran, and R. Srikanth, (2010) to distinguish between single and multi-authored works, as suggested. To further analyze the intellectual structure of the field, VOS viewer, a bibliometric mapping tool developed by Van Eck and Waltman, open-source software was used to create visual representations of co-authorship networks, keyword co-occurrences, and bibliographic coupling. This software facilitates the identification of key research clusters and collaboration patterns within the domain of green entrepreneurship. By leveraging bibliometric indicators and visualization techniques, the study provides a comprehensive overview of research growth, authorship trends, and collaborative dynamics in the field. These tools usage of facilities of creation of maps, co-authorship networks, document with organization are utilized to assess the impact and development of the research field.

7. Result Analysis and Interpretation:

7.1 Year Wise Literature in Green Entrepreneurship Research Output:

The table 1 presents the green Entrepreneurship research measured the year wise authors' contribution of literature in Indian country research output during the period 2010-2024(15years).

Table 1: Year wise Literature

S.No	Year	Records	Cum. Records	Percentage
1	2010	6	6	0.10%
2	2011	14	20	0.23%
3	2012	21	41	0.34%
4	2013	32	73	0.53%
5	2014	47	120	0.77%
6	2015	64	184	1.05%
7	2016	83	267	1.36%
8	2017	129	396	2.12%
9	2018	149	545	2.45%
10	2019	247	792	4.06%
11	2020	364	1156	5.98%
12	2021	574	1730	9.43%
13	2022	947	2677	15.55%
14	2023	1483	4160	24.36%
15	2024	1929	6089	31.68%
		6089		100

A total of 6089 records exists during this time span; the imitated research output of Green Entrepreneurship is 6 (0.10%) articles in 2010 and 6089 (31.68%) articles in 2024. During this period, gradually rose in 2016 (83 records) 1.36%, and the greatest increased publications in 2019 (247 articles) 4.06%, and from 2020 to 2024 (31.68%) the highest publishing increased, with an average of 405 each year.

7.2 Relative Growth Rate and Doubling Time for Green Entrepreneurship in India:

Table 2 shows an overview of Green Entrepreneurship research from 2010 to 2024, assessed by Relative Growth Rate (RGR) and Doubling Time (DT). The findings indicate fluctuations in growth, ranging from 0.24 to 1.15 over this period. The Tools used Doubling time formula applied it varies from 0.39 to 4.81 during this period. It has been tremendous growth of Doubling Time (Dt) of 4.81 in 2017 and the decreasing trend in 2015 of 2.84 (Dt).

Table 2: Relative Growth Rate and Doubling Time

S.No	Year	Records	Log eW1	LogeW2	RGR	(DT) 0.693
1	2010	6	0	1.79	0	0.39
2	2011	14	1.79	3.04	1.25	0.55
3	2012	21	3.04	3.47	0.42	1.65
4	2013	32	3.47	3.85	0.39	1.8
5	2014	47	3.85	4.17	0.32	2.14
6	2015	64	4.17	4.42	0.24	2.84
7	2016	83	4.42	4.86	0.44	1.57
8	2017	129	4.86	5	0.14	4.81
9	2018	149	5	5.51	0.51	1.79
10	2019	247	5.51	5.9	0.39	1.79
11	2020	364	5.9	6.35	0.46	1.52
12	2021	574	6.35	6.85	0.5	1.38
13	2022	947	6.85	7.3	0.45	1.55

14	2023	1483	7.3	7.56	0.26	2.63
15	2024	1929	7.56	8.71	1.15	0.6
		6089				

The growth has increased in 83 records in 2016 and its maximum increased RGR of 0.51 in 2018 and the doubling Time of 1.79. Finally, it can be observed the RGR is highly increased (1.15) in 2024 and Average Growth rate of Doubling Time is 1.80.

7.3 Authorship Pattern in Green Entrepreneurship:

The figure 1 shows that the authorship pattern of distribution of the papers according to a number of authors. The data indicate that the single authors 430 publications (7.06%) out of 6089 total publications, double authors published 1502 publications (24.67%), three authors published 1391 publications (22.84%), four authors published percentage of 17.54% and five authors paper published percentage of 12.10%. The same six to ten above authors published the publications percentage of below 10% of total output.

Table 3: Authorship Pattern

S.No	Year	Single	Double	Three	Four	Five	Six	Seven	Eight	Nine	10 Above	Total
1	2010	2	0	1	2	1	0	0	0	0	0	6
2	2011	6	2	4	1	1	0	0	0	0	0	14
3	2012	8	7	4	0	2	0	0	0	0	0	21
4	2013	8	9	5	3	0	3	2	0	0	2	32
5	2014	12	13	10	5	3	1	0	0	0	2	47
6	2015	12	22	12	5	4	1	0	1	1	6	64
7	2016	16	37	14	7	4	3	0	0	0	2	83
8	2017	23	51	26	14	6	2	3	2	1	1	129
9	2018	13	64	29	18	11	5	1	1	0	7	149
10	2019	30	66	63	30	27	7	13	0	5	6	247
11	2020	36	109	99	57	24	11	8	3	3	14	364
12	2021	46	143	123	120	64	30	14	8	9	17	574
13	2022	49	226	189	174	122	67	41	20	21	38	947
14	2023	84	340	364	273	185	107	59	30	11	30	1483
15	2024	85	413	448	359	283	156	63	47	29	46	1929
		430	1502	1391	1068	737	393	204	112	81	171	6089
		-7.06%	-24.67%	-22.84%	-17.54%	-12.10%	-6.45%	-3.35%	-1.84%	-1.33%	-2.81%	-100%

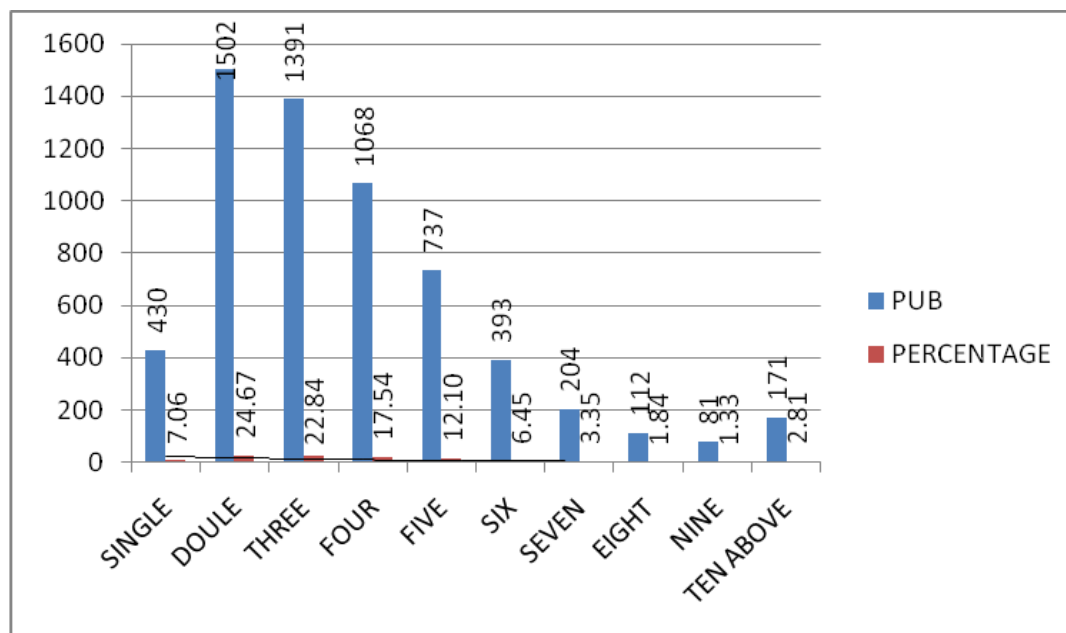


Figure 1

7.4 Collaborative Index, Collaborative Co-Efficient, and Degree of Collaboration:

Table 4 shows a consistent increase in the Degree of Collaboration (DC) over time, from 0.67 in 2010 to a high of 0.96 in 2024. The overall average DC value of 0.82 indicates that the majority of research publications are co-authored rather than single-authored. The highest rates of collaboration have been reported in recent years, particularly since 2022. The Collaborative Index (CI) has fluctuated over time, reaching its lowest value of 1.89 in 2012 and peaking at 4.22 in 2022. This upward trend indicates a growing number of researchers collaborating on papers, with an increasing number of authors per publication in recent years. Equally, the Collaborative Coefficient (CC) has shown a rising trend, increasing from 0.49 in 2010 to 0.67 in 2024. The overall mean CC value of 0.54 suggests a balanced mix of single and multiple authorships, with a noticeable shift towards multi-authored research in recent years.

Table 4: Collaborative Index, Collaborative Co-Efficient, and Degree of Collaboration

S.No	Year	Single Authors	Multiple Authors	Total Publications	DC	CI	CC
1	2010	2	4	6	0.67	3.00	0.49
2	2011	6	8	14	0.57	2.21	0.37
3	2012	8	10	21	0.60	1.89	0.32
4	2013	8	23	32	0.74	3.06	0.49
5	2014	12	34	47	0.74	2.80	0.48
6	2015	12	62	64	0.84	3.66	0.56
7	2016	16	67	83	0.81	2.63	0.49
8	2017	23	107	129	0.82	2.78	0.51
9	2018	13	135	149	0.91	3.41	0.57
10	2019	30	217	247	0.88	3.89	0.59
11	2020	36	330	364	0.90	3.73	0.60
12	2021	46	531	574	0.92	3.97	0.63
13	2022	49	898	947	0.95	4.22	0.66
14	2023	84	1401	1483	0.94	3.99	0.65
15	2024	81	1834	1929	0.96	4.09	0.67
		426	5661	6089	0.82	3.29	0.54

7.5 Keyword Co-Occurrence of Green Entrepreneurship:

Table 5 and Figure 3 show the distribution of terms within a certain study topic, with an emphasis on themes such as sustainability, bibliometric analysis, innovation, and entrepreneurship. The research uses a full counting method to determine keyword co-occurrences based on author keywords. A minimum occurrence requirement of five was applied to a total of 14,944 terms, yielding 850 keywords that met the criteria. The overall strength of these 850 keywords' co-occurrence relationships with other keywords is computed. The selection prioritizes terms with the greatest total link strength. However, certain keywords aren't related. The largest connected set contains 849 keywords, showing a high level of linkage within the dataset. The network map showcases how various concepts are interconnected, helping to identify the predominant topics of areas for future investigation. In keyword analysis represented by nodes, the big circle is for the often used the word, whereas the smaller nodes are for least used the words.

Table 5: Keyword Co-Occurrence of Green Entrepreneurship

S.No	ID	Keyword	Occurrences	Total Link Strength
1	13239	Sustainability	418	1067
2	6919	India	338	740
3	1035	Bibliometric analysis	225	595
4	13355	Sustainable Development	164	425
5	7162	Innovation	137	379
6	4401	Entrepreneurship	123	302
7	1912	Circular economy	113	290
8	2739	Covid-19	126	285
9	7059	Industry 4.0	103	279
10	13580	Systematic literature review	109	269
11	659	Artificial intelligence	107	250
12	12383	smes	81	238
13	1293	Blockchain	83	210
14	909	Aarriers	68	200
15	13362	Sustainable development goals	72	183
16	8044	Literature review	68	181
17	2669	Corporate social responsibility	75	167
18	13728	Technology	57	157
19	13177	Supply chain Management	58	149
20	14577	Vosviewer	46	149

In this visualization, clustering approach combines keywords on the basis of their 850 keyword co-occurrences and in total 14944 keywords. From these documents, 849 keywords were included in the network, thus being used together collectively by people at maximum ten times. The core terms of 'sustainability', 'bibliometric analysis', 'sustainable development' Kumari, Ritu and Kumar, Deepak, 2024 and 'innovation' and 'Entrepreneurship', industry 4.0 are shown with large nodes of frequent usage in the field. This image presents a visual representation of distribution of keywords within the research field focusing on the green entrepreneurship and entrepreneur and sustainability related themes.

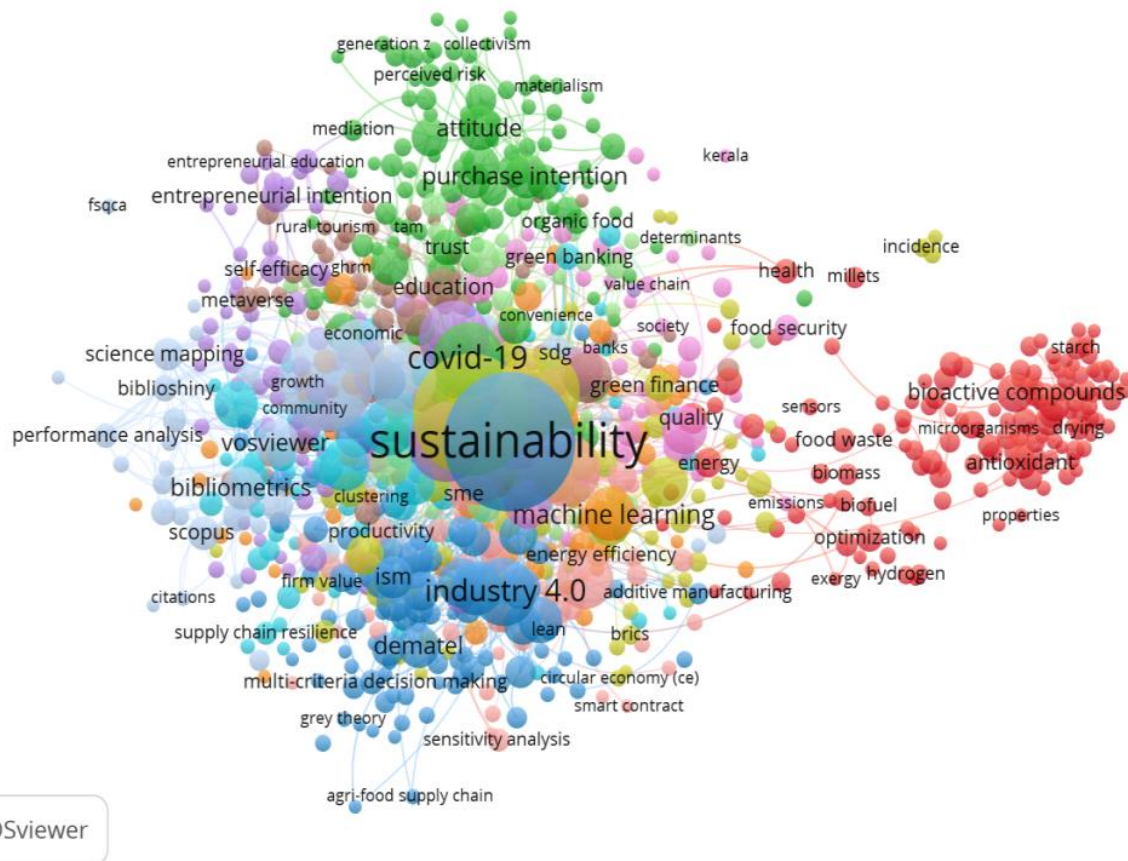


Figure 2

7.6 Co-Authorship with Authors of Green Entrepreneurship in India:

The table on co-authorship analysis looks at author collaboration using a comprehensive counting method. The study examines a maximum of 25 writers per document and establishes a minimum of five documents per author. Out of 11,102 authors, 702 meet this requirement. The total strength of each of these 702 authors' co-authorship links with other authors is determined, and the ones with the highest total link strength are chosen. However, some of these 702 authors are not linked together, and the largest connected network consists of 685 authors. Kumar S is the top contributor with the most papers (97) and total link strength of 255. Although Kumar S has the most documents (148), the overall relationship strength is slightly lower at 248. Other notable contributors include Singh A with 103 documents and Singh S with 148 documents, having total link strengths of 206 and 199, respectively.

Table 6: Co-Authorship with Authors of Green Entrepreneurship

S.No	ID	Author	Documents	Total Links Strength
1	5139	Kumar, S	167	326
2	9123	Sharma, P	97	255
3	5098	Kumar, A	126	248
4	9370	Singh, A	103	206
5	9432	Singh, S	148	199
6	5126	Kumar, N	61	129
7	5149	Kumar, V	66	127
8	9427	Singh, R	64	127
9	6422	Nagaprasad, N	32	123
10	9082	Sharma, A	74	115
11	6255	Moses, J A	61	113
12	5130	Kumar, P	72	112
13	5133	Kumar, R	62	110
14	1826	Chatterjee, S	46	106
15	581	Anandharamakrishnan, C	56	103
16	10375	Upadhyay, A	35	102
17	3450	Gupta, S	66	101
18	1863	Chaudhuri, R	40	97
19	5484	Luthra, S	34	95
20	10022	Tarafdar, A	26	92

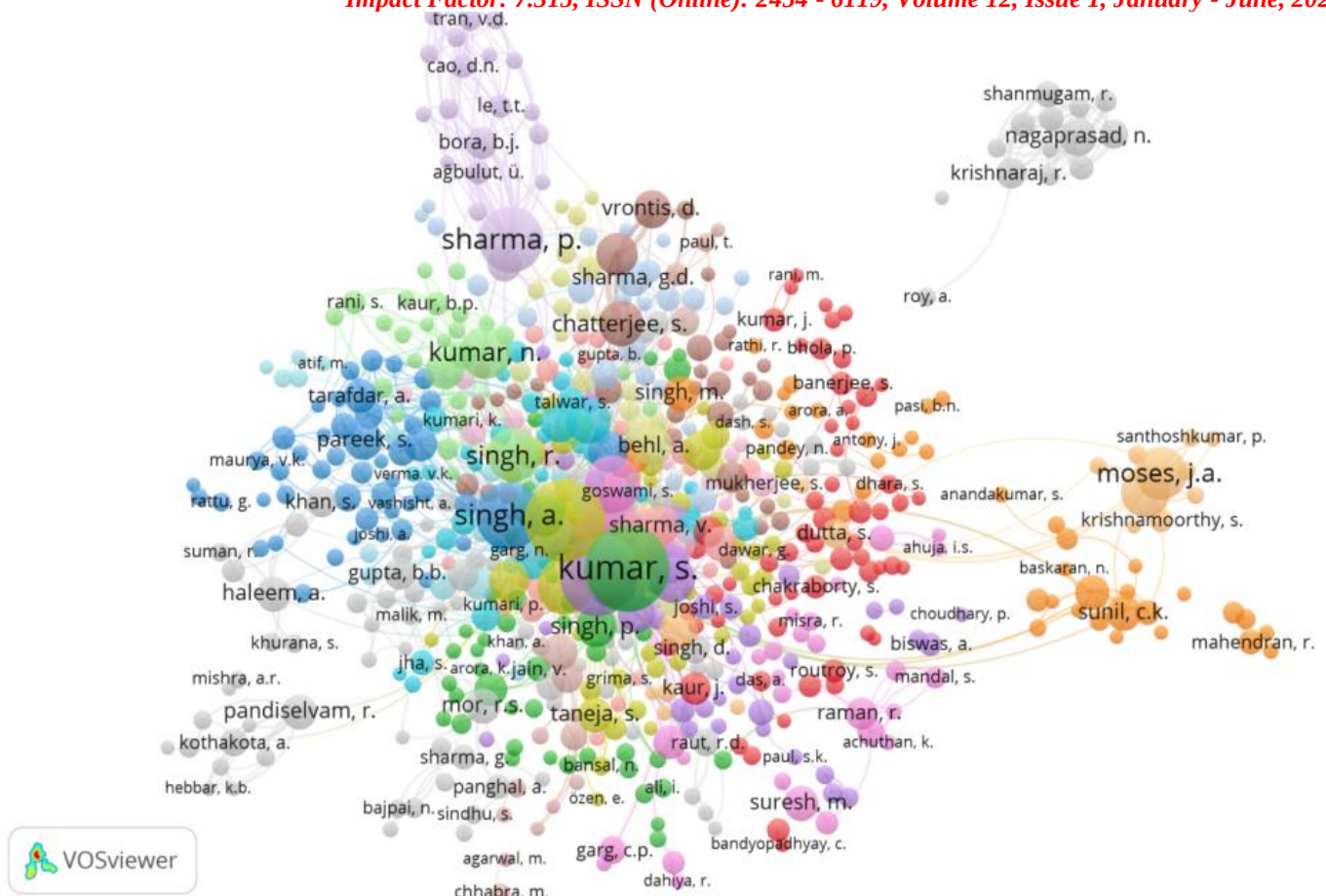


Figure 3

7.7 Co-Authorship with Organization:

Figure 3 shows that 224 out of 13930 organizations meet the conditions for full counting, minimum number of organizations per document, minimum number of documents, and minimum number of citations. For each of the 224 organizations, the total strength of co-authorship ties with other organizations will be calculated. The organizations with the highest total link strength will be chosen. There are 224 organizations to choose from, with only 126 items calculated. According to the research, the top ten organizations had the most citations, 39 publications, and a total of 93 links to other organizations. Department of Management, School of Business Law, University of Agder published 25 documents with the second greatest citations (1654) and a total link of 66.

Table 7: Co-authorship with organization

S.No	ID	Organization	Documents	Citations	Total Link
1	10679	Optentia research focus area, North-West University	39	2710	93
2	8912	Institute of engineering, hutech university	25	719	76
3	5308	Department of Management, school of business law, University of Agder	25	1654	66
4	10758	Patet research Group, hi chi minh city open university	20	525	66
5	6477	Department of project management ho chi minh city open university	27	46	59
6	958	center for interdisciplinary research, university of petroleum and energy studies	14	55	41
7	3173	Department of computer applications, Alagappa university	16	28	41
8	8932	institute of informatics and computing energy, university of Tenaganational	13	17	38
9	12727	sybiosis centre for information technology(scit) sybiosis international university	11	51	38
10	4674	Department of information systems, stmikpringsewu	13	15	37

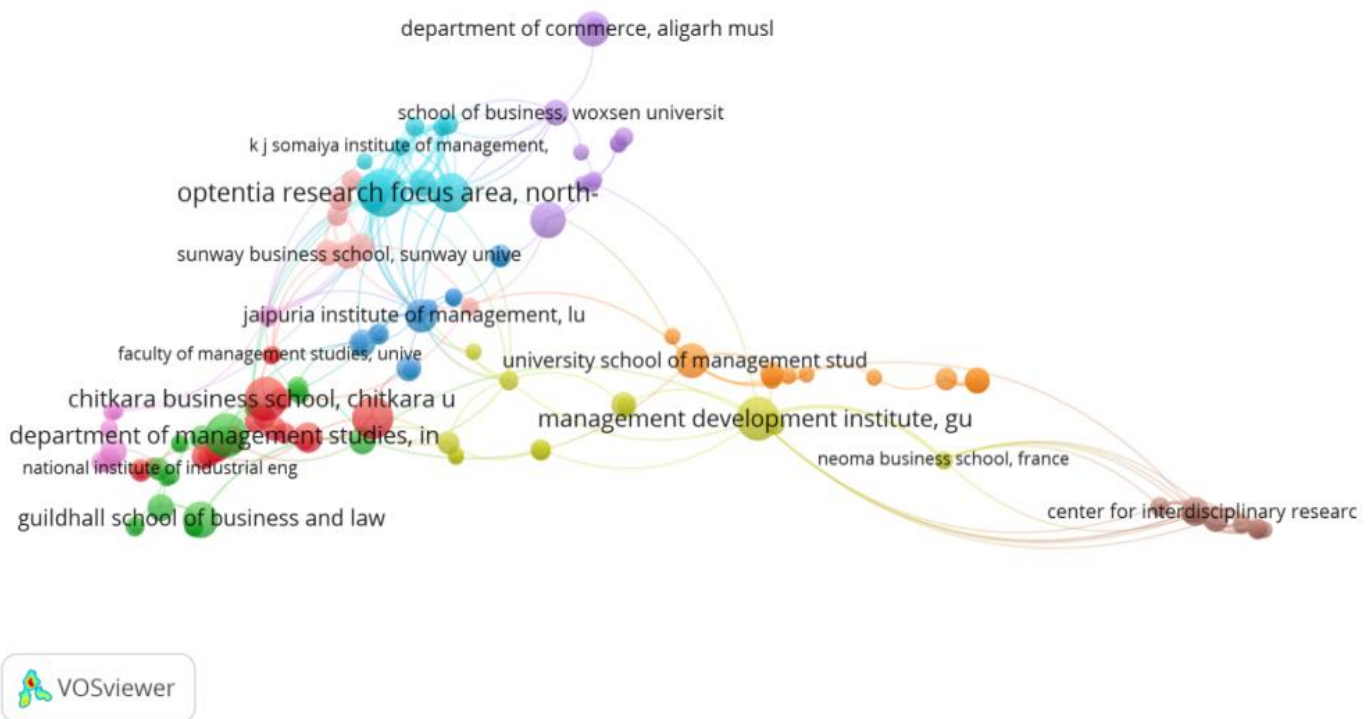


Figure 4

7.8 Bibliographic Coupling with Countries:

The table presents data on the minimum number of documents and citations per country, with a threshold of at least five documents and citations. Out of 166 countries, 85 met this criterion. For each of these 85 countries, the total strength of bibliographic coupling links with other countries was calculated, and those with the highest total link strength were selected. The results indicate that the United Kingdom is the most prolific, contributing 385 documents with 12,500 citations. The United States follows closely with 377 documents, but it has the highest number of citations at 14,327. The UK's total link strength is followed by that of the United States. Other countries show a gradual decline in documents, citations, and total link strength in the field of green entrepreneurship.

Table 8: Bibliographic Coupling with Countries

S.No	ID	Country	Documents	Citations	Total Link Strength
1	66	India	6059	92916	1828536
2	157	United Kingdom	385	12500	396418
3	158	United States	377	14327	333676
4	89	Malaysia	206	4873	227584
5	53	Ffrance	155	7904	223421
6	13	Australia	205	8028	210245
7	31	China	193	5692	168239
8	127	Saudi Arabia	216	3092	167817
9	135	South Africa	108	4935	134303
10	72	Italy	106	2663	133180
11	156	United Arab Emirates	116	2592	103104
12	106	Norway	71	3852	95646
13	38	Cyprus	44	457	95630
14	161	Viet Nam	99	1674	94534
15	17	Bangladesh	84	1197	81695
16	67	Indonesia	76	375	75931
17	153	Turkey	93	1726	66028
18	56	Germany	60	2369	62166
19	29	Canada	93	2587	61075
20	145	Taiwan	74	1695	57539

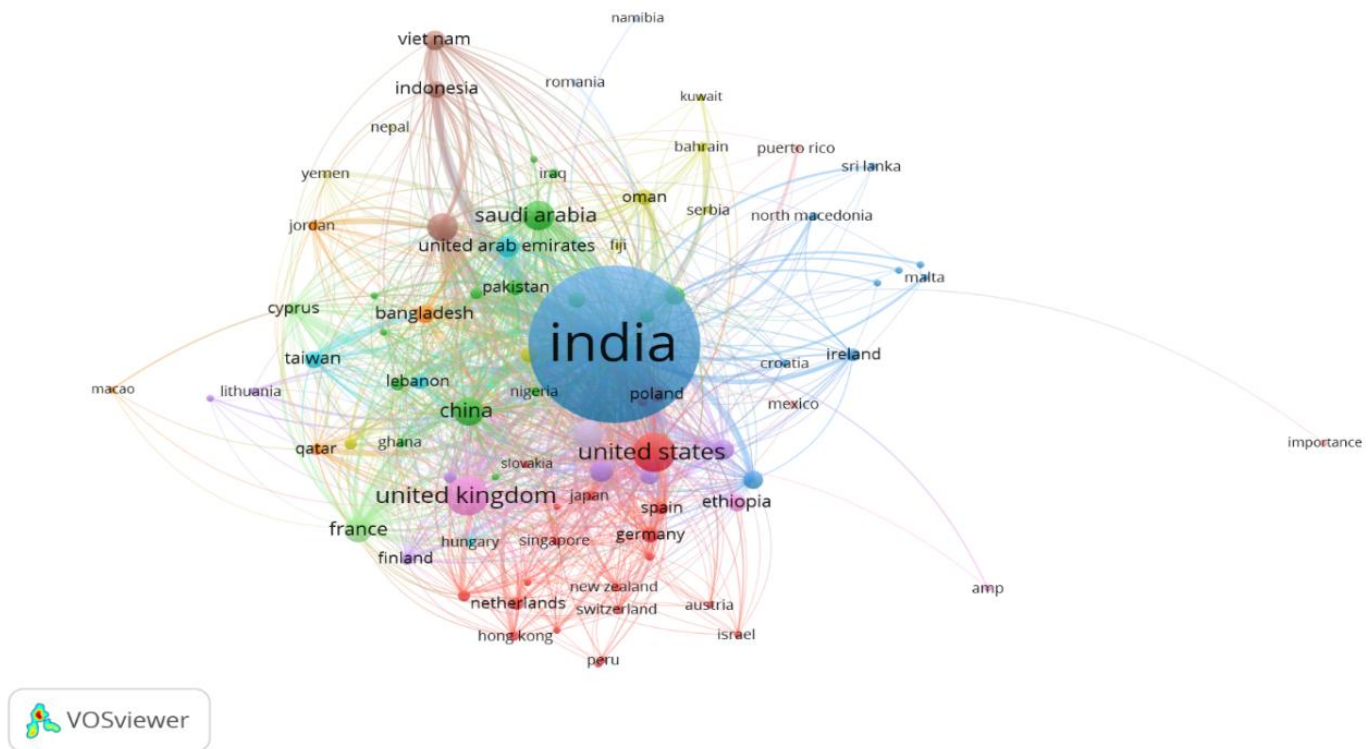


Figure 5

8. Discussion and Findings:

- The analysis of publication growth during the period revealed a consistent increase in productivity throughout the year. The highest output was recorded in 2019 at 4.06% and gradually rose to 31.68% by 2024.
- The study analyzed the Relative Growth Rate (RGR) and Doubling Time across the years. It was observed that the RGR was 0.24 in 2015 and increased significantly to 1.15 by 2024. Furthermore, Doubling Time was recorded at 0.55 in 2011, with the highest value of 4.81 observed in 2017.
- The authorship pattern reveals that the majority of documents, accounting for 90%, were published by multiple authors, while single authors contributed the least, making up only 10% of the total publications.
- The mean degree of collaboration is 0.82. The lowest collaborative index and collaborative coefficient were recorded in 2012 at 1.89 and 0.32, respectively.
- Keyword co-occurrence analysis revealed that "sustainability" was the most frequent term, appearing 418 times and having the highest total link strength of 1,067 in Green Entrepreneurship research. Other commonly used keywords included "Sustainable Development," "Innovation," and "Entrepreneurship."
- The largest co-authorship network comprised 685 authors, with Kumar S being the most prolific, having published 167 documents with overall total link strength of 326. In terms of institutional collaboration, Green Entrepreneurship research in India was associated with 13,930 organizations, but only 126 organizations were connected through co-authorship.

9. Conclusion:

This study on Green Entrepreneurship in India analyzes the yearly growth of literature, degree of collaboration, authorship patterns, keyword co-occurrences, and bibliographic coupling during the period from 2010 to 2024. Optentia Research Focus Area, North-West University, contributed 39 published documents, receiving the highest citation count of 2,710, while other organizations contributed 93 publications. The bibliographic coupling analysis showed that India had the highest number of linked documents (385) with the United Kingdom, which also had the highest citation count (12,500) and total link strength of 396,418.

The study underscores the rapid expansion of Green Entrepreneurship research in India with a strong trend toward multi-authored collaborations. Keyword analysis confirms the relevance of sustainability-related themes, and bibliographic coupling indicates strong international collaboration, particularly with the United Kingdom. Overall, the findings highlight the growing impact and collaborative nature of Green Entrepreneurship research. The increasing trend in publications, strong institutional partnerships, and evolving keyword trends indicate a promising future for this field. Encouraging further collaboration and interdisciplinary research will be essential for driving innovation and sustainability in entrepreneurial studies.

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