



MAPPING THE LANDSCAPE OF CIRCULAR ECONOMY RESEARCH IN INDIA: A BIBLIOMETRIC ANALYSIS

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ABSTRACT

Circular economy which was a buzzword few years back is gaining momentum across the world. It is an economic system aimed at minimizing waste and making the most of resources. It is a model that contrasts with the traditional linear economy, which follows a 'take, make, dispose' approach. The circular economy involves designing products for longer use, promoting reuse, repair, refurbishment, and recycling to create a closed-loop system, thus reducing the need for new resources and minimizing environmental impact. This study aims at identifying the publication trends related to the landscape of circular economy in India. Publications were searched from Dimensions database. Software assisted bibliometric analysis was performed for bibliographic visualizations and examining the knowledge creating networks. Total 221 publication items went into the analysis. Results reveal about the prominent journals, authors, organisations, and publications in the field. Advancing knowledge in circular economy requires interdisciplinary research and collaboration various disciplines, including business, environmental science, engineering, and policy studies. Focusing research on sectors related to the circular economy, such as agriculture, manufacturing, renewable energy, and e-waste management, while strengthening policy support through government initiatives, can promote sustainable and innovative solutions in India's circular economy.



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1. INTRODUCTION

A circular economy involves the repurposing of goods that are nearing the end of their life cycle, thereby minimizing waste and closing loops within an industrial ecosystem [1-3]. Various studies have highlighted the importance of the circular economy as it can lead to economic growth, reduce the use of natural resources, offer environmental protection, and have positive social implications [4-7]. It is becoming an essential tool for activating sustainable development processes [8], [9] and is being prioritized by policymakers [10]. Academic research is also increasingly focused on the circular economy, particularly in areas such as product design [11], business models [12-14], agricultural waste management [15], [16], and sustainable supply chains [17]. Numerous studies have indicated that the global landscape of circular economy research is expanding, with environmental, economic, and social implications that necessitate the development of competencies and capabilities while offering a fertile ground for further research [5], [18-20].

The circular economy research is gaining traction in India also and is important for several reasons. Firstly, India is a rapidly growing economy with a large population and diverse industries, which puts significant pressure on resources and generates substantial waste. Embracing circular economy principles can help India address these challenges by minimizing waste, conserving resources, and promoting sustainable consumption and production patterns [21], [22]. Secondly, circular economy practices can contribute to India's sustainable development goals. By transitioning from a linear economy (where resources are extracted, used, and disposed of) to a circular economy (where resources are reused, recycled, and regenerated), India can achieve economic growth while reducing its environmental footprint.

Circular economy approaches can help decouple economic growth from resource consumption, leading to improved resource efficiency and reduced environmental impacts. Thirdly, circular economy research in India can foster innovation and create new business opportunities [23]. Circular economy practices promote resource efficiency, waste valorization, and sustainable business models, fostering the growth of green industries, creating employment opportunities, and improving competitiveness [24], [25]. Research in this area can provide insights into technological advancements, policy frameworks, and market opportunities that can support the growth of circular economy-oriented businesses in India. Moreover, circular economy research in India can contribute to global sustainability efforts. As one of the world's largest economies and a major contributor to global resource consumption and waste generation, India's adoption of circular economy principles can have significant environmental and social benefits.

Sharing research findings and best practices with the global community can inspire and inform circular economy transitions in other countries, promoting a more sustainable and inclusive future. Mapping the prominent journals, authors, organizations, and publications in the field of circular economy research in India through a rigorous bibliometric analysis is essential for several reasons. Firstly, it provides a comprehensive understanding of the current research landscape in India, identifying the key contributors and knowledge dissemination platforms. This information helps researchers and policymakers to recognize the most influential voices and sources of knowledge in the field, enabling them to stay informed about the latest developments and trends. Secondly, the mapping of prominent journals, authors, organizations, and publications facilitates knowledge exchange and collaboration.

By identifying the leading researchers, institutions, and publications, it becomes easier to establish connections and foster interdisciplinary collaborations. Researchers can leverage the expertise and networks of influential authors and organizations, leading to synergistic efforts and the generation of high-quality research outputs. Thirdly, the mapping of the circular economy research landscape aids in identifying research gaps and areas that require further exploration. By analyzing the distribution of publications across different topics and sectors, researchers can identify underrepresented areas and direct their efforts towards addressing those gaps. However, no such study has been conducted so far. Therefore, a bibliometric analysis of circular economy research in India is necessary to understand research trends, identify research gaps, and suggest future research directions. Such an analysis can aid policymakers and researchers in developing effective strategies to promote a circular economy in India and address challenges related to waste management and resource efficiency.

II. MATERIALS AND METHODS

For retrieving the publications, researcher searched for the items in Dimensions database on January 20, 2023. To populate the list of publications, terms “circular economy” and “India” were entered into the search field to search for them in ‘title and abstracts’ by using a Boolean “AND”. Search resulted in total 368 documents, filter was applied to exclude the publication items which were not the research articles. Finally, 221 items went into the analysis. It is notable from Table 1 that the period between 2016 and 2023 witnessed a notable surge in publications on the circular economy in India, indicating a significant increase in research activity in this field. This can be attributed to several factors. Firstly, the global emergence and recognition of the circular economy concept prompted researchers to explore its applicability and implications specifically in the Indian context. Secondly, growing environmental concerns in India, such as pollution and resource depletion, have spurred a focus on sustainable approaches like the circular economy.

Thirdly, supportive policies and initiatives such as “National Mission on Sustainable Agriculture”, National Policy of Plastic Waste Management”, “National Mission on Sustainable Habitat” by the Indian government have encouraged research in this area. Additionally, the pressing need for sustainable solutions in the face of population growth, urbanization, and resource scarcity has motivated scholars to investigate the circular economy's potential benefits. Lastly, research and funding opportunities have become available, attracting scholars to delve into this field. Collectively, these factors have contributed to the increased scholarly interest and research activity in the circular economy in India during this time frame. Table 2 classifies the publications on the basis of ANZRC categories of research and also on the basis of the sustainable development goal. Maximum number (74) of circular economy publications have been published in the area of “Engineering”. The “Engineering” category of ANZRC covers a broad range of engineering disciplines, which allows for a diverse range of research topics related to circular economy.

For example, researchers may investigate the design and implementation of circular economy solutions in the manufacturing industry, or the development of sustainable building materials and infrastructure. Moreover, the circular economy is a relatively new concept in India, and research in this area is still in its nascent stage. The Engineering category of ANZRC may offer a suitable platform for researchers to explore and test circular economy concepts and practices in a variety of engineering fields. Overall, the large number of circular economy publications in the Engineering category of ANZRC in India suggests that the engineering community is taking an active interest in circular economy principles and is exploring ways to apply them in their respective fields of study. Software (VOSviewer) assisted bibliometric analysis is conducted by the researcher. Results include bibliographic coupling analysis of journals, research papers, and institutions, and co-citation analysis.

Table 1: Publication items and Percentages by Publication Years.

Publication Years	Publication items	Percentage of 221
2023	6	2.71
2022	83	37.55
2021	67	30.31
2020	46	20.81
2019	8	3.61
2018	5	2.26
2017	4	1.80
2016	2	0.90

Source: Authors, (2026).

Table 2: Classification of Publications.

Field of research (ANZRC 2020)	Number of publications	Field of research (Sustainable Development Goals)	Number of publications
Engineering	74	Responsible Consumption and Production	179
Environmental Science	70	Affordable and Clean Energy	27
Commerce Management Tourism and Services	45	Climate Action	20
Built Environment and Design	43	Industry, Innovation and Infrastructure	11
Human Society	27	Sustainable Cities and Communities	11
Law and Legal Studies	15	Zero Hunger	7
Agricultural Veterinary and Food Sciences	13	Life on Land	7
Biological Sciences	11	Clean Water and Sanitation	6
Economics	11	Decent Work and Economic Growth	4
Information and Computing Sciences	10	Life Below Water	3
Earth Sciences	5	Good Health and Well Being	2
Health Sciences	3	No Poverty	1
Philosophy and Religious Studies	3		
Biomedical and Clinical Sciences	2		
Education	2		
Language Communication and Culture	2		
Physical Sciences	2		
Chemical Sciences	1		
History, Heritage and Archaeology	1		

Source: [26].

III. RESULTS AND DISCUSSION

This section presents the results of the bibliometric analysis conducted to map the prominent journals, authors, organizations, and publications in the field of circular economy research in India. The analysis provides valuable insights into the current research landscape and highlights key contributors and influential entities in the field.

III.1 JOURNALS

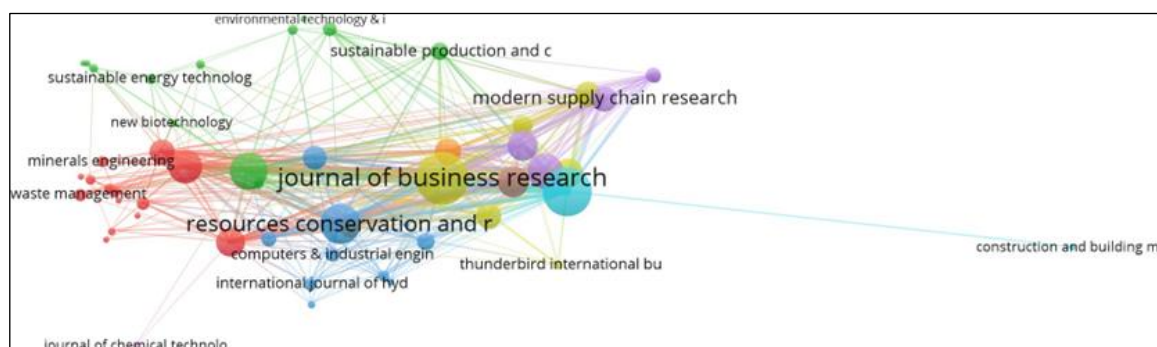


Figure 1: Network Visualisation of Journals (source: figure by authors).

Source: Authors, (2026).

Bibliographic coupling of the journals with network visualization is presented in Figure 1. Due to a smaller number of publications in the area, analysis included all the sources by keeping the number of documents of a source at minimum level 1, however the minimum number of citations of a source was set at 5 to get the most prolific journals. With these values, out of the 126 sources, 58 met the threshold, however the visualisation shows the largest set of connected items which consisted of 53 items. Bigger the size of a circle, higher the link strength of that journal. Top three journals in terms of total link strength are “Journal of Business Research”; “Journal of Cleaner Production”; and “Resources Conservation and Recycling”. “Journal of Cleaner Production” is at top in terms of number of papers published (17) and citations (479). Table 3 lists the top 15 journals. The Journal of Business Research has made a significant contribution to the field of circular economy in India by publishing a range of articles that explore various aspects of circular economy adoption by businesses, particularly SMEs.

These articles have provided insights into the barriers and drivers of circular economy adoption, identified gaps in current research, and proposed practical solutions for promoting circular economy practices in Indian industries. The journal has also contributed to the development of conceptual frameworks and models for understanding circular economy adoption by SMEs in emerging markets. Overall, the Journal of Business Research has helped to raise awareness and advance knowledge of circular economy practices in the Indian context. The Journal of Cleaner Production has made significant contributions to the field of circular economy in India by publishing research articles related to circular economy practices, challenges, and opportunities in various industries and sectors, such as agriculture, construction, manufacturing, and waste management. The journal has provided a platform for researchers to share their findings on circular economy-related topics, such as circular supply chain management, life cycle assessment, sustainable product design, and green innovation.

The articles published in the journal have helped in identifying the gaps in the existing circular economy practices and provided insights into the potential solutions and strategies to overcome these challenges. Resources Conservation and Recycling which is another leading journal in the field of circular economy and sustainability has made significant contributions to the circular economy landscape in India. The articles published in this journal have covered a wide range of topics related to circular economy, including the impact of COVID-19 on ship recycling, circular economy readiness in MSMEs, the role of blockchain in circular and modified linear economy, critical factors for remanufacturing, circular economy-induced employment shifts in apparel value chains, and advancing the assessment of circular economy strategies through material circularity and life cycle indicators. These articles have contributed to the development of knowledge and understanding of the circular economy in India, and have provided valuable insights for policymakers, researchers, and practitioners in the field. The inclusion of journals such as the Journal of Business Research, Journal of Cleaner Production, Resources Conservation and Recycling, Sustainability, Business Strategy and the Environment, and Environmental Science and Pollution Research highlights the multidisciplinary nature of circular economy research. It signifies that studies on circular economy in India encompass a wide range of topics, including business models, production processes, environmental conservation, sustainability practices, and waste management. Additionally, the presence of journals like Waste Management & Research, Journal of Environmental Management, Cleaner Logistics and Supply Chain, and Environment, Development and Sustainability indicates a specific focus on the circular economy within the waste management sector and the integration of sustainable practices across various industries.

Table 3: Top 15 Journals (criteria-total link strength).

Rank	Journal	No. of papers	Citations	Total link strength
1	Journal of Business Research	9	57	1238
2	Journal of Cleaner Production	17	479	1049
3	Resources Conservation and Recycling	6	372	628
4	Sustainability	12	116	561
5	Business Strategy and the Environment	3	46	468
6	Environmental Science and Pollution Research	8	161	419
7	Journal of Enterprise Information Management	1	7	343
8	Journal of Modelling in Management	2	24	332
9	International Journal of Productivity and Performance Management	1	7	287
10	Waste Management & Research the Journal for a Sustainable Circular Economy	6	12	287
11	Environment, Development and Sustainability	3	34	239
12	Modern Supply Chain Research and Applications	1	15	201
13	Journal of Environmental Management	6	106	196
14	Cleaner Logistics and Supply Chain	1	12	195
15	Management Decision	3	157	194

Source: Authors, (2026).

III.2 PROLIFIC AUTHORS

Table 4: Highly Cited Authors.

Rank	Author	Affiliation	Citations	Publications	Total link strength
1	Pradip Kalbar	IIT Mumbai	160	3	0
2	Rajesh Kumar Singh	MDI India	158	2	0
3	Sarat Kumar Jena	XIM University	120	2	2
3	Deepak Singhal	KIIT University	120	2	2
5	Rakesh D Raut	National Institute of Industrial Engineering	115	2	0
6	Sachin Kumar Mangla	O. P. Jindal Global University	108	4	13
7	Sudhanshu Joshi	Doon University	97	3	5
7	Manu Sharma	London Metropolitan University, UK	97	3	5
9	Purushothaman Chirakkuzhyil Abhilash	Banaras Hindu University	90	2	2
9	Priya Priyadarshini	Banaras Hindu University	90	2	2
11	Prem Vrat	The Northcap University	83	3	4
11	Ashwani Kumar	IIM Rohtak	83	2	2
13	Ayush Gautam	IIT Delhi	50	2	4
13	Ravi Shankar	IIT Delhi	50	2	4
15	Kannan Govindan	University of Southern Denmark, Denmark	42	3	5
15	Ashish Malik	University of Newcastle Australia	31	2	0
15	Rohit Panchal	National Institute of Industrial Engineering, India	30	2	2

Source: Authors, (2026).

In VOS minimum number of documents was set to two and minimum number of citations at five which resulted in 43 authors meeting the thresholds. A network of 43 authors has 903 possible co-authors (links) but in the network shown in Figure 2 only 44 links are present resulting in a very poor network density of $0.04 < 1$ (poorly knit network). A poorly knit network can have several implications. First, it suggests that researchers in the field have very few communication pathways to other authors, they are not working together and sharing their knowledge and expertise. This can result in duplication of efforts and missed opportunities for collaboration and innovation. Second, a lack of communication pathways can lead to limited dissemination of research findings and slower progress in the field.

Third, a poorly knit network may hinder the development of interdisciplinary research collaborations, which are crucial for addressing complex issues related to circular economy in India. Therefore, the low network density highlights the need for more collaboration and communication among researchers in the field of circular economy in India. This can be achieved through various means such as organizing workshops, conferences, and networking events, promoting interdisciplinary research collaborations, and fostering a culture of knowledge sharing and open communication. Such efforts can help to build a more robust research network and accelerate progress towards a sustainable circular economy in India. Table 4 summaries the results for top 15 most cited authors in the field along with their publications and total link strength.

It reveals that circular economy research in India is a multidisciplinary field, with contributions from researchers in diverse disciplines such as engineering, management, and sustainability. It also suggests that institutions such as IIT Mumbai, MDI India, and XIM University are leading research hubs in this field, with researchers affiliated to these institutions featuring prominently in the top 15 author list. Moreover, the presence of researchers from international universities such as London Metropolitan University, UK, University of Southern Denmark, Denmark, and University of Newcastle Australia in the top 15 author list suggests that circular economy research in India is gaining global recognition and attention. Researchers- Pradip Kalbar, Rajesh Kumar Singh, and Sarat Kumar Jena have made significant contributions to the field of circular economy research in India.

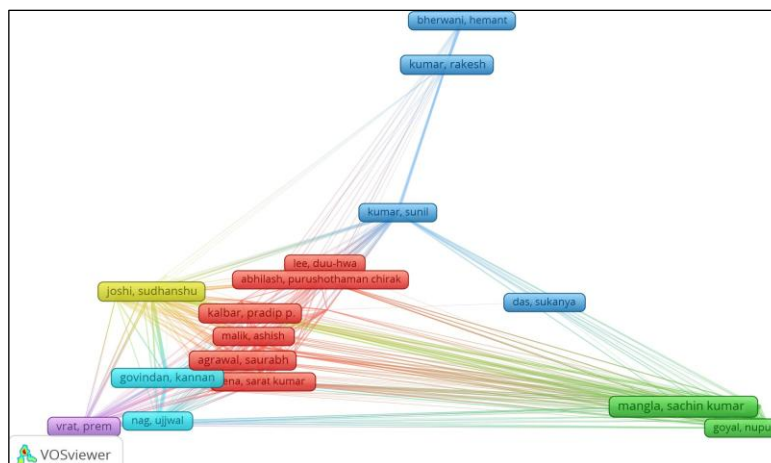


Figure 2: Clusters of author collaboration (source: figure by authors).
Source: Authors, (2026).

III.3 PROMINENT ORGANISATIONS

Network visualisation of organizations engaged in the field of circular economy research in India is presented in Figure 3. For analysis, value of minimum number of documents published by an organisation was set at three and minimum citations at five. Out of 248 organisations 27 met the threshold. It is clear that Indian Institutes of Technology (IIT) in Delhi and Mumbai, as well as Management Development Institute (MDI), are the top organizations in terms of citations and number of articles. This suggests that these institutions are actively involved in conducting research in the field of circular economy in India, and their research output is being cited frequently. Moreover, National Institute of Industrial Engineering, Amity University, Delhi University, Banaras Hindu University, and Graphic Era University are also among the top organizations, indicating that they too are actively involved in research in this field and have made significant contributions. It is worth noting that while some institutions have a higher number of articles, they may not necessarily have the highest number of citations. This may indicate that the quality of research output from these institutions may not be as impactful or influential as those with fewer articles but higher citations. Furthermore, from Table 5 it is interesting to observe the presence of international universities such as Aston University, Yonsei University, and University of Southern Denmark, among others, indicating collaboration between Indian and international scholars on circular economy research.

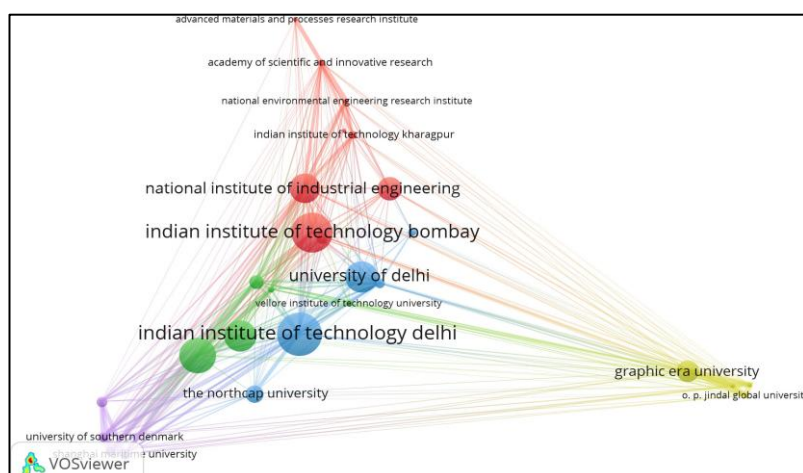


Figure 3: Network Visualisation of Research Organizations (source: figure by authors).
Source: Authors, (2026).

Table 5: Prominent Organizations.

Rank	Organization	Citations	Number of Articles
1	IIT Delhi	227	8
2	IIT Mumbai	210	7
3	MDI	181	6
4	Amity University	160	3
5	Delhi University	158	3
6	National Institute of Industrial Engineering	150	6
7	Banaras Hindu University	116	3
8	Graphic Era University	108	3
9	Northcap University	83	3
10	Aston University	64	4
11	BITS Pilani	50	4
12	Anna University	48	3
13	IIT Roorkee	43	5
14	Shanghai Maritime University	42	3
14	University of Southern Denmark	42	3
14	Yonsei University	42	3
15	Teri University	36	4

Source: Authors, (2026).

III.4 POPULAR PUBLICATIONS

For analysis, minimum number of citations of a document was set at 50, out of total 221 documents 17 met the threshold. Instead of all the items, only the largest set (14 items) of connected items has been shown in Figure 4. Table 6 lists the 15 top cited papers. Top cited article “Agricultural waste: Review of the evolution, approaches, and perspectives on alternative uses” provides a comprehensive review of the evolution, approaches, and perspectives on the alternative uses of agricultural waste in India. The author discusses the current state of agricultural waste management in India and highlights the challenges faced by the country in this regard. The article also highlights the potential benefits of converting agricultural waste into useful products such as biofuels, bioplastics, and animal feed. Furthermore, the author presents an overview of the various methods used for the conversion of agricultural waste, such as anaerobic digestion, pyrolysis, and fermentation. The article also reviews the policy framework related to agricultural waste management in India and highlights the need for a comprehensive policy that promotes the circular economy.

Overall, the article provides an insightful analysis of the circular economy landscape in India with respect to agricultural waste management and highlights the need for a holistic approach to address the challenges faced in this domain. Second top cited article “Waste-to-energy nexus for circular economy and environmental protection: Recent trends in hydrogen energy” by Surbhi Sharma (2020) discusses the potential of using waste-to-energy (WtE) technologies for the development of circular economies and environmental protection, with a focus on recent trends in hydrogen energy. The article presents a comprehensive review of various WtE technologies, their potential benefits and drawbacks, and explores the concept of circular economy and how WtE can play a crucial role in its development. The article also discusses the emerging trends in hydrogen energy production from WtE technologies and highlights its potential as a clean, efficient, and sustainable energy source for the future.

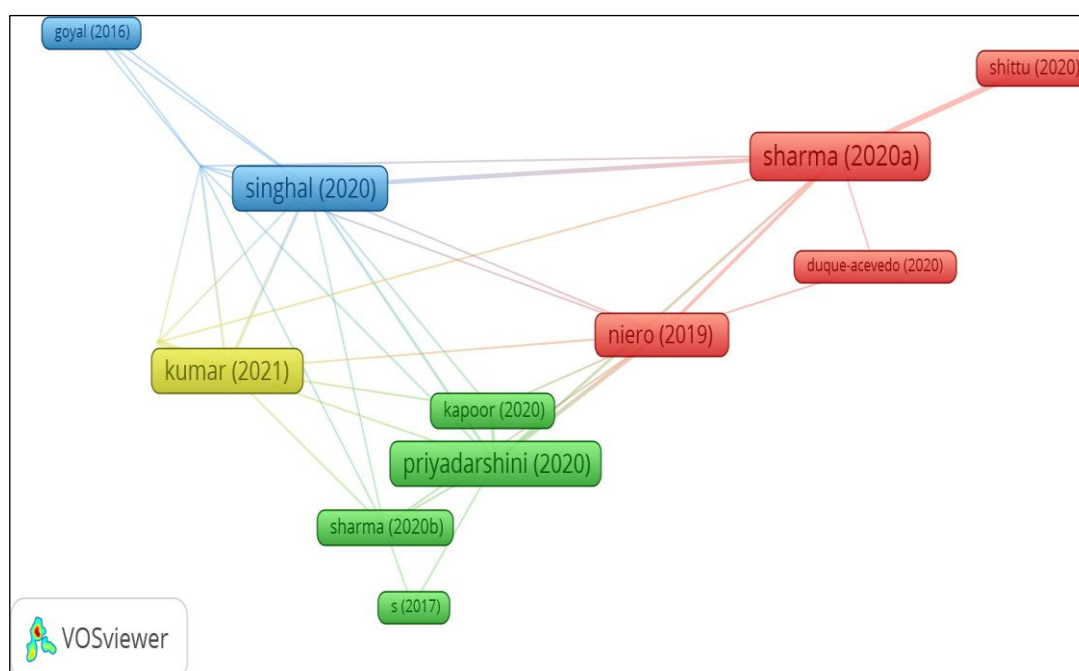


Figure 4 Network Visualisation of Publications (source: figure by authors).

Source: Authors, (2026).

Table 6: Top Cited Research Papers.

Rank	Paper	First Author (Year)	Journal	Citations	Strength
1	Agricultural waste: Review of the evolution, approaches, and perspectives on alter- native uses	Monica D Acevedo (2020)	Global Economy and Conservation	190	2
2	Waste-to-energy nexus for circular economy and environmental protection: Recent trends in hydrogen energy	Surbhi Sharma (2020)	The Science of the Total Environment	180	6
3	Application of industry 4.0 technologies in SMEs for ethical and sustainable operations: Analysis of challenges	Ravinder Kumar (2020)	Journal of Cleaner Production	155	10
4	Valorization of agricultural waste for biogas based circular economy in India: A research outlook	Rimika Kapoor (2020)	Bioresource Technology	152	6
5	Circular economy business models in developing economies: Lessons from India on reduce, recycle, and reuse paradigms	Sandeep Goyal (2016)	Thunderbird International Business Review	127	3
6	Global E-waste management: Can WEEE make a difference? A review of e-waste trends, legislation, contemporary issues and future challenges	Shittu S Olanrewaju (2020)	Waste Management	115	6
7	To identify industry 4.0 and circular economy adoption barriers in the agriculture supply chain by using ISM- ANP	Shashank Kumar (2021)	Journal of Cleaner Production	113	16
8	Coupling material circularity indicators and life cycle-based indicators: A proposal to advance the assessment of circular economy strategies at the product level	Monia Niero (2019)	Resource Conservation and Recycling	110	13
9	Circular economy practices within energy and waste management sectors of India: A meta-analysis	Priya Priyadarshini (2020)	Bioresource Technology	90	15
10	When challenges impede the process	Yogesh Kumar Sharma (2019)	Management Decision	90	10

Source: Authors, (2026).

The study concludes by providing an outlook on the challenges and opportunities for WtE technologies in the context of circular economy and environmental protection. Third top article “Application of industry 4.0 technologies in SMEs for ethical and sustainable operations: Analysis of challenges” by Ravindra Kumar (2020) focuses on the application of Industry 4.0 technologies in Small and Medium Enterprises (SMEs) to achieve ethical and sustainable operations. The paper analyzes the challenges that SMEs face in implementing these technologies and provides insights into how these challenges can be overcome. The study suggests that Industry 4.0 technologies can enable SMEs to adopt ethical and sustainable practices, improve productivity, and reduce costs. The paper also discusses the role of government and industry associations in supporting SMEs in their adoption of these technologies. Overall, the paper highlights the potential benefits of Industry 4.0 technologies in promoting sustainability and ethical practices in SMEs. Based on the list of top cited articles in the field of circular economy in India, several insights can be made.

Firstly, it is apparent that there is a diverse range of research topics within the field of circular economy in India. The top cited articles cover a variety of themes, including waste management, energy, agriculture, and technology adoption. This suggests that the circular economy is not limited to one specific sector or area, but rather is a broad concept that can be applied across a range of industries and contexts. Secondly, it is interesting to note that several of the top cited articles focus on the challenges and barriers to implementing circular economy practices in India. This highlights the need for further research and understanding in this area, as well as the importance of addressing these challenges in order to promote sustainable and circular practices. Finally, it is worth noting that many of the top cited articles are authored by researchers based in India, indicating a growing interest and investment in circular economy research within the country. This is further supported by the fact that several of the top cited articles are published in Indian academic journals, indicating that there is a significant amount of research being conducted on this topic within India itself.

IV. CONCLUSION

This study significantly contributes to the existing literature on the circular economy landscape in India by mapping the prominent journals, authors, organizations, and publications through a rigorous bibliometric analysis. The findings offer valuable insights into the scientific research networks focusing on circular economy in India. Notably, esteemed Indian institutions such as IIT Delhi, IIT Bombay, and MDI Gur- gaon have emerged as influential knowledge producers in this field. Among the top journals, “Journal of Cleaner Production,” “Sustainability,” and “Journal of Business Research” have published a substantial number of papers, indicating their significance in the dissemination of research. The most prominent authors identified include Pradip Kalbar (IIT Mumbai), Rajesh Kumar Singh (MDI Gurgaon), and Sarat Kumar Jena (XIM University, Bhubaneswar). Furthermore, highly cited research papers such as “Agricultural waste: Review of the evolution, approaches, and perspectives on alternative uses,” “Waste-to-energy nexus for circular economy and environmental protection: Recent trends in hydrogen energy,” and “Application of industry 4.0 technologies in SMEs for ethical and sustainable operations: Analysis of challenges” underscore the impact of these studies in shaping the circular economy discourse.

To advance knowledge in this field, fostering interdisciplinary research and collaboration among scholars from various disciplines such as business, environmental science, engineering, and policy studies is crucial. Targeting specific sectors related to the circular economy, such as agriculture, manufacturing, renewable energy, and e-waste management, for further research can address existing knowledge gaps. It is essential to strengthen policy support by continually enhancing and incentivizing circular economy practices, resource efficiency, and waste management through government initiatives. By integrating these recommendations, researchers, policymakers, and practitioners can collectively promote sustainable and innovative solutions in the circular economy domain in India.

V. AUTHOR'S CONTRIBUTION

Conceptualization: Shailendra Singh Rana, and Diplesh Gautam.

Methodology: Shailendra Singh Rana, and Diplesh Gautam.

Investigation: Shailendra Singh Rana, Mahadev Madgule, Ajay D. Pingale, and Diplesh Gautam.

Discussion of results: Shailendra Singh Rana, Mahadev Madgule, Ajay D. Pingale, and Diplesh Gautam.

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Writing–Review and Editing: Shailendra Singh Rana, Mahadev Madgule, Ajay D. Pingale, and Diplesh Gautam.

Resources: Shailendra Singh Rana, and Diplesh Gautam.

Approval of the final text: Shailendra Singh Rana, and Diplesh Gautam.

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