



Research Performance of the Indian Journal of Engineering from 2014 to 2023: A Bibliometric Analysis

Parameshappa Kenchakaller

Research Scholar, Dept. of P. G. Studies and Research in LIS Kuvempu University, Karnataka

Prof. B. S. Biradar

Professor, Dept. of P. G. Studies and Research in LIS Kuvempu University, Karnataka

Abstract

The study investigates the scientific productivity of the Indian Journal of Engineering (IJE) as a scientometric analysis parameter. The data collected from website of said journal from 2014–2023 and also Scopus database were only considered from 2019–2023 because this journal was indexed from 2019. The journal had the highest published articles with 55 (15.406%) in 2016. A maximum of 193 analysis papers and Sarsam S. I. has the highest number of 17 papers published. With 129 two-author papers published and secured zone 1, the journal received 78 citations, h and g-index 3 with a 0.5 m-index, and a total publication of 199 results from the Scopus database since 2019. The top most, with 73 articles was contributed by Nigerian researchers. Highly cited paper, Prediction of diabetes in adults using a supervised machine learning model, by Upadhyay S. in 2023, the Federal University of Technology, Akure, Nigeria, had the highest number of articles published, and Asphalt concrete is the most common keyword, indicating a focus area. This paper could be helpful to study further core journals that the scientific community and academic institutions of developing countries have performed.

Keywords: Bibliometric Analysis, Bibliometrix R Package, Biblioshiny, Indian Journal of Engineering, Scopus Database, VOSviewer

1. Introduction

The word 'scientometrics' was started in 1969 by Nalimov J. M. Mulchenko. It is a study with quantitative analysis of scientific research productivity in a particular field and one of the major areas of research in library and information science (Vaishya, 2023). The scientometrics analysis study is divided into three major laws for analyzing the data: Lotka's, Bradford's, and Zipf's. Lotka's law indicates author productivity, Bradford's law is journal or source productivity, and Zipf's law is the frequency of words (Desai &

Megna, 2024). The present study assesses the Indian Journal of Engineering and its focus on Bradford's law (Saranya, 2023) & (Paul & Dutta, 2024).

The Indian Journal of Engineering is an open-access journal research contribution in the emerging areas of engineering, innovative trends, technology, public policies, and technological challenges to encourage researchers to perform their investigations and theoretical findings in as much detail as possible. An international peer-reviewed journal published by Discovery Scientific



Society, a company that has published scientific periodicals since 2012. The service provided to scholars worldwide ensures the investigation is freely available and all the content is shared under the Creative Commons Attribution license.

2. Review of the Related Literature

They investigated the scientometric analysis of the Journal of Climate during 2014-2018 data exported from the Web of Science database. The journal contributed 2787 publications and the study conducted various scientometric parameters (Prakash & Jayaprakash, 2019). The scientometric analysis of current science journal data collected from the Scopus database from 1990-2017. The study has attempted various measured techniques output patterns, collaboration trends, citations, country, organization, and highly cited papers (Marisha, 2019). They analyzed the Indian Journal of Marketing in the dimension of bibliometric data collected from the Scopus database during the study period 2013-2019. The study examines various parameters of the journal output, authorship pattern, prolific author, organizations keyword co-occurrences (Kappi et al., 2020). The investigated ophthalmic research output was published by the Indian Journal of Ophthalmology from 2005 to 2017 using scientometric terms. The data was collected from the PubMed database and then tabulated XML into Microsoft Access. The study examines the types of documents, the author's impact, and their citations (Ramadoss & Yadalla, 2020). The study examines the scientometric analysis of the Journal of Optics published by Springer from the Optical Society of India. The data was collected from the Scopus database from 1996-2021. The study examines annual research output, a pattern of citations, authorship pattern and collaboration co-efficient, county collaboration, highly cited

papers, and institutions (Kappi & Biradar, 2022).

3. Objectives of the Study

- ❖ To examine the annual growth rate of publications
- ❖ To identify the types of documents
- ❖ To examine the authorship pattern and author impact
- ❖ To examine the journal impact factor with an example of Bradford's law
- ❖ To examine the most contributing country, affiliation and co-occurrence keyword

4. Research Methodology

The study of scientometric analysis to examine the association between scientific research and the study used two techniques for gathering data 157 publications through the website of the Indian Journal of Engineering and 201 publications through the Scopus database from the 2019 search strategy for advanced search and the name of the source or journal. After reflecting on the data, we refined it for the required study field and merged 357 publications from 2014–2023. The data was collected on April 27, 2024. 201 publications of the Indian Journal of Engineering were taken out in BibTeX, CSV, and RIS bibliographic formats according to Scientometric terms. The retrieved data will undergo a very meticulous transition into scientometric form using Biblioshiny (Bibliometrix R Package) software for measuring data. In this regard, the required measuring techniques were used as tools for data visualization purposes through VOSviewer and Biblioshiny (Aria & Cuccurullo, 2017).

5. Data analysis and Interpretation

The below following mentioned table and figures identified several scientometric



dimensions as conducted under the objectives.

5.1 Annual growth rate of publications

The Annual Growth Rate (AGR) can be calculated using the formula proposed by (Gracio et al., 2013). Annual Growth Rate is the increase in the value of publications over the period. The formula to calculate the Annual Growth Rate is as below:

$$AGR = \left(\frac{P_{CY} - P_{LY}}{P_{LY}} \right) \times 100$$

Where, AGR=Annual Growth Rate

P_{CY} = Number of publications in the current year

P_{LY} = Number of publications in the last year

The journal experienced fluctuations in publication rates, with notable growth in 2016 and 2020. There was a significant decline in growth rates in several years. Highest with 55 (15.406%) papers published and the annual growth rate (AGR) is the highest increase with 161.905 in 2016 followed by a total of 49 (13.735%) papers published in 2020.

Table1: Annual growth rate of publications

Year	Volume No.	Issues No.	TP	Percentage (%) n=357	AGR
2014	7 to 11	17-27	22	6.162	0
2015	12	28-30	21	5.882	-4.545
2016	13	31-34	55	15.406	161.905
2017	14	35-38	28	7.843	-49.091
2018	15	39-42	30	8.403	7.143
2019	16	43-46	34	9.524	13.333
2020	17	47-48	49	13.725	44.117
2021	18	49-50	44	12.325	-10.204
2022	19	51-52	37	10.364	-15.909
2023	20	53-54	37	10.364	0
Total			357	100	

TP= Total Publication, AGR= Annual Growth Rate

5.2 Types of publications

This table represents the types of publications in the Indian Journal of Engineering that published research articles, analysis reviews, perspectives, communication, surveys, case study editorial

material, reports, and methods. The journal published a maximum of 193 analysis papers and research paper 87 articles during the study period. Therefore, the journal could enhance its coverage or quality.



Table 2: Types of publications

Year	Research Paper	Analysis	Reviews & Perspective	Communication & Survey	Case Study & Editorial	Report & Method	Total Publications
2014	11	10	1	-	-	-	22
2015	2	18	-	1	-	-	21
2016	10	41	1	2	1	-	55
2017	8	16	-	2	2	-	28
2018	7	2	5	7	3	-	30
2019	8	13	2	4	3	4	34
2020	14	20	3	5	2	4	49
2021	13	21	2	-	-	8	44
2022	13	22	-	-	-	2	37
2023	1	30	2	-	-	4	37
Total							357

5.3 Most prolific authors

Figure one shows a co-authorship network map from VOSviewer software. After exported data was examined through VOSviewer software exciting information

about authors. Sarsam S I is the highest 17 papers published with 8 link strength, followed by Upkapa C P 15 papers with 12 link strength, and Nkoi B 8 papers published with 8 links strength to co-authors.

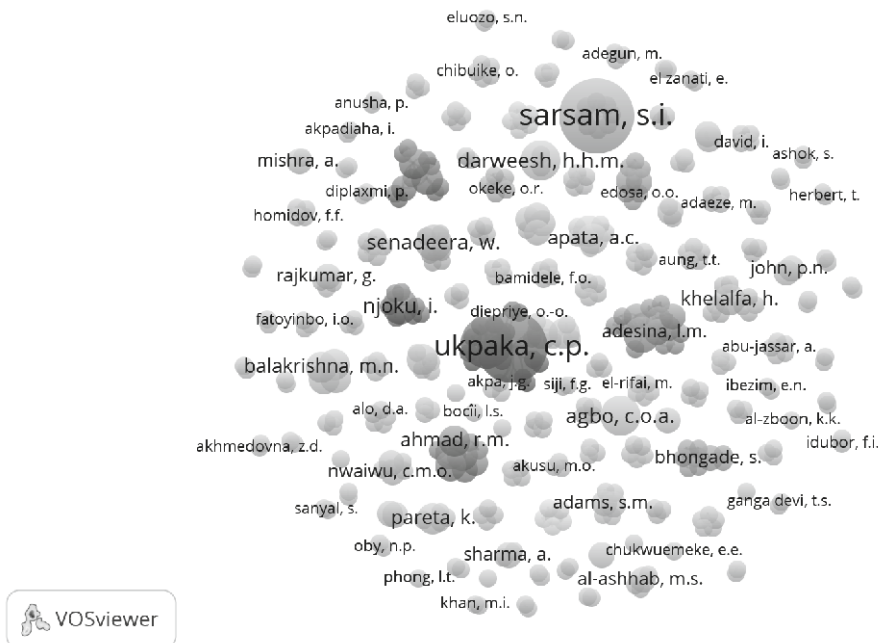


Figure-1: Co-Authorship Network Map



5.4 Authorship pattern

A deeper dive into co-authorship patterns, including collaborations beyond the journal, could reveal more about influential research networks. However, authorship patterns one of the major concepts of

scientometric analysis and the table shows the year-wise pattern like single, two, three, four, and more than five authorship documents. The majority of 129 papers are authored by two researchers, with a small proportion of single-authored or multi-authored papers.

Table 3: Authorship pattern

Year	Single	Two	Three	Four	Five>	Total Publications
2014	5	11	3	1	2	22
2015	2	11	4	3	1	21
2016	7	26	19	2	1	55
2017	5	8	9	3	3	28
2018	5	7	5	10	3	30
2019	2	13	7	9	3	34
2020	9	18	7	6	9	49
2021	16	11	8	7	2	44
2022	5	9	13	7	3	37
2023	4	15	6	4	8	37
Total	60	129	81	52	35	357

5.5 Impact of the Indian Journal of Engineering

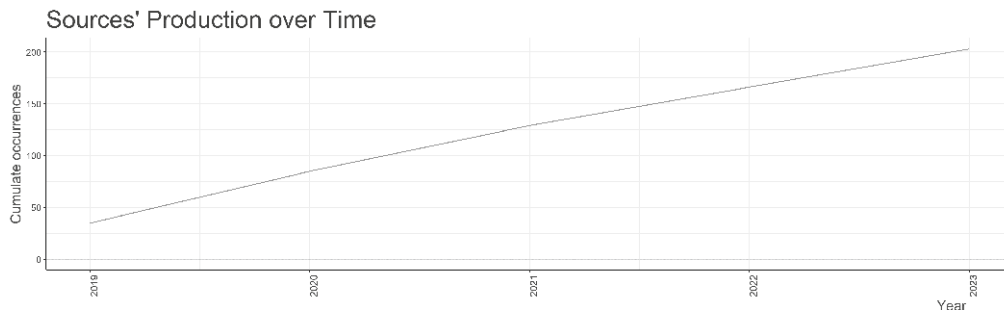
The journal was indexed in Scopus with a zone-1 classification, h-index of 3, and a SJR-2023 score of 0.13. A total of 78 citations, h and g-index 3 with 0.5 m-

index, and total publications of 199 this data from the Scopus database since 2019. The study provides Figure 2 which is an example of Bradford's law this term indicates the journal impact factor parameter in scientometric analysis.

Table 4: Impact of Indian Journal of Engineering

Database	h_index	g_index	m_index	Citation	NP	PY_start	Zone	SJR-2023 score
Scopus	3	3	0.5	78	199	2019	1	0.13

NP= Number of Publications, PY= Publication Year, SJR= Scimago Journal Ranking



Source



INDIAN JOURNAL OF ENGINEERING

Figure-2: Journal Production (2019-23)

5.6 Top most collaborated countries

Table 5 shows the top-most-contributed countries and its exciting result in the journal has the highest, with 73 articles contributed by Nigerian researchers, followed by Indian researchers who published 68 articles. A dominant presence and explore opportunities

for increasing international contributions and diversifying the geographic representation. The table is shown also the SCP and MCP ratios. Figure 3: Country Collaboration Network data visualization map showing the publication collaboration link between nations at the global level.

Table 5: Country-wise collaboration

Country	Articles	TC	ACPA	SCP	MCP	Freq	MCP_Ratio
Nigeria	73	21	0.	69	4	0.36	0.055
India	68	11	68	65	3	0.335	0.06
Iraq	17	15	17	17	0	0.084	0
Egypt	8	9	8	7	1	0.039	0.125
China	6	3	6	6	0	0.03	0
Uganda	4	2	4	1	3	0.02	0.75
Jordan	3	3	3	2	1	0.015	0.333
United Kingdom	3	1	3	3	0	0.015	0
Algeria	2	1	2	0	2	0.01	1
Australia	2	1	2	2	0	0.01	0
Total	186	67					

TC=Total Citations, ACPA= Average Citation Per Article, SCP=Single Country Publication, MCP= Multiple Countries Publications

Country Collaboration Map

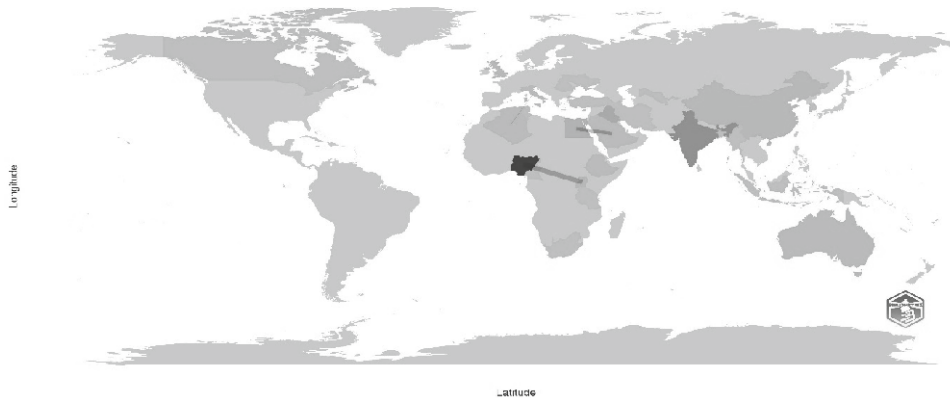


Figure 3: Country collaboration network map

5.7 Highly cited papers in the Indian Journal of Engineering

Table 6 represents highly cited papers in the Indian Journal of Engineering this part indicates the name of the author, title, year, total citation, TCPY, and Normalized total

citation. Highly cited paper Prediction of diabetes in adults using supervised machine learning model by Upadhyay S in 2023. The first seven authors had equal citations received and the last three authors received 2 citations in this study.

Table 6: Highly cited papers in the Indian Journal of Engineering

Name of the First Author	Title of the Paper	Year	Total Citations	TC per Year	Normalized TC
Upadhyay S	Prediction of diabetes in adults using supervised machine learning model	2023	3	1.50	15.86
Safarov I I	On the dynamic stress - strain state of isotropic rectangular plates on an elastic under-vibration loads	2020	3	0.60	4.32
Pareta K	Effect of Laxmanpur barrage on the river system: A case study through multi-temporal satellite remote sensing data	2020	3	0.60	4.32
Al-Zboon K K	Impact of olive cake combustion on ambient air quality using AERMOD model	2020	3	0.60	4.32
Alabi O O	Upgrade a low - grade Wasagu -Danko (Nigeria) manganese ore using gravity separation method	2020	3	0.60	4.32
Saha S	Numerical simulation on the magnetic fluid flow through a channel	2020	3	0.60	4.32
Nsatak W A	Evaluation of solar panel for improved performance	2021	3	0.75	6.95
Sarsam S I	Influence of aging on volumetric properties of rubber -modified asphalt concrete	2021	2	0.50	4.63
Emmanuel U I	Path loss mitigation for digital terrestrial transmission in onne, Rivers State, Nigeria	2022	2	0.67	9.25
Siji F G	An improved model for comparing different endpoint detection and response tools for mitigation insider threat	2023	2	1.00	10.57



6. Finding and Discussion

The major findings of the journal experienced fluctuations in publication rates, with notable growth in 2016 and 2020. There was a significant decline in growth rates in several years. The majority of papers are authored by two researchers, with a small proportion of single-authored or multi-authored papers. The journal was indexed in Scopus with a zone-1 classification, h-index of 3, and a SJR score of 0.13. There are significant contributions from Nigerian researchers and institutions. The most cited paper involves diabetes prediction using machine learning. Predominantly Nigerian institutions contribute the most articles. The Asphalt Concrete is the most common keyword, indicating a focus area. The study discusses journal research productivity and impact factors with Bradford's law led by the 'Bibliometric' methods and also examined by the leading journal-ranking databases.

7. Conclusion

The study explores fluctuating trends in publication types and growth rates that correlate with global or regional advancements in engineering research. Comparing the impact factor and citation metrics with similar journals could provide insights into the journal's relative standing and areas for improvement. A deeper dive into co-authorship patterns, including collaborations beyond the journal, could reveal more about influential research networks. Keywords evolve and their relevance to emerging trends in engineering could provide strategic insights for future publications. An in-depth analysis of citation patterns, including the influence of highly cited papers on the journal's reputation, could be valuable. The study helps future researchers investigate the highest-contributed countries' dominant presence and explore opportunities for increasing

international contributions and diversifying the geographic representation. The outcomes are significant visions for motivating the scientific community to investigate the trending topics. Therefore, this paper is limited to the Indian Journal of Engineering, and it could be helpful to study further core journals that the scientific community and academic institutions of developing countries have performed.

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