

A Citation Analysis of the Indian Journal of Engineering and Materials Science

Kousik Chatterjee

Abstract:

The study analyses 89 full-length Research Articles published during 2007-08 in the Indian Journal of Engineering and Materials Science. Indian Journal of Engineering and Materials Science is linked most closely with Aerospace Engineering, Mechanical, Metallurgical, Electrical and Electronics Engineering, Computer Science, Environmental Engineering, Heat Transfer, Fluid Mechanics, Instrumentation and Materials Science. Overall, 1662 citations were made during this period. The results indicate that 25.84% articles (citing articles) published in these issues were three authored. The authorship pattern of citation (cited articles) shows that 17.07% papers are single authored, 20.35% and 27.64% papers were double and triple authored respectively. The result reveals that journal articles were predominant with 80.35% of total citation. The ratio of Author Self Citation to Total Citations was 1:10.7. The ratio of Journal Self Citation to Total Citations was 1:17. Indian contributions comprise 19% of the total citations. The highest percentage of year-wise journal citation was found to be 39.22% in the period of 2001-2008.

Key words: Authorship Pattern; Citation Analysis; Indian Journal of Engineering and Materials science; Bibliometrics.

Introduction

Citation analysis has been widely used to investigate the structure of scholarly articles in various subject fields like natural and social sciences as well as in the field of technology and applied sciences.

An essential part of research papers, particularly in the domain of applied science and technology, is the list of references pointing to prior publications. In general, according to Smith⁽¹⁰⁾, a citation implies a relationship between a part or the whole of the citing documents. Citation analysis is that area of bibliometrics that deals with the study of these relationships. Norms for citing as well as authorship patterns vary greatly from disciplines to disciplines.

Just as there are a number of reasons why citations exist⁽¹⁰⁾, there may be a number of reasons why a citing author has not provided a link to certain other documents. The reason is that a prior document is not relevant to the present work or author was unaware of document or could not obtain it or could not read the language in which it was published.

The popular and easiest technique¹⁰ to use a citation count is determining how many citations have been received by a given document or set of documents over a period of time from a particular set of citing documents.

Present trend, quality of science and technology journals in India and Scope of Indian Journal of Engineering and Materials Science

The Accreditation bodies and quality control mechanisms insist the academic institutions in the country to acquire quality and standard journals. It has been well documented that most of the Indian journals in the field of Science and Technology lack quality in content.

Author's Affiliation: *Librarian, Bengal Institute of Technology, Tech Town(on Basanti Highway), P.O Hadia, Kolkata, West Bengal 700150

Reprint's request: Kousik Chatterjee, 2 No Shibtala Lane, P.O. Ghurni, Krishnagar, Dist-Nadia, State: West Bengal, India, PIN 741103. E-mail: kcaglibra@rediffmail.com, kousik.chatt@gmail.com

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Major criticisms are leveled against Indian journals in the recent past. International databases and secondary services include only a very few Indian journals. The simple reason is that many Indian journals do not have peer review policy⁽²⁾. A journal is accepted as a qualitative and standard journal only when it is peer reviewed (if possible international peers) and it has international editorial board and has international authorship.⁽²⁾

A present study commissioned by the Department of Science and Technology has identified a few peer reviewed journals in the Science and Technology. According to this study,⁽²⁾ only less than 10% journals published from India are standard and quality journals. Peer reviewed journals lists 75 journals in the field of Engineering and Technology in which Indian Journal of Engineering and Materials Science is included(S I No.15)⁽²⁾.

SCImago Journal and Country Rank⁽⁹⁾ is a portal that includes the journals and country scientific indicator, developed from the information contained in the Scopus database(Elsevier B.V). These indicators can be used to assess and analyze scientific domains .The platform takes it name from the SCImago Journal Rank(SJR) indicator developed by SCImago from the widely known algorithm google page rank. According to SJR, H Index⁽⁹⁾ of the Indian Journal of Engineering and Materials Science is 9(in 2007).

Indian Journal of Engineering and Materials Science was published by National

Institute of Science Communication and Information Resources (NISCAIR) in association with Indian National Science Academy. Started in 1994, it publishes papers in Aerospace Engineering, Mechanical, Metallurgical, Electrical and Electronics Engineering, Computer Science, Environmental Engineering, Heat Transfer, Fluid Mechanics, Instrumentation and Materials Science. The Journal is issued bimonthly and indexed by Applied Mechanical Review, Chemical Abstract, Current Contents, Metal Abstract, Engineers India, Cambridge Science Abstract, and Math review, NCI Current Contents, ARAI Automotive Abstract and Indian Science Abstract.

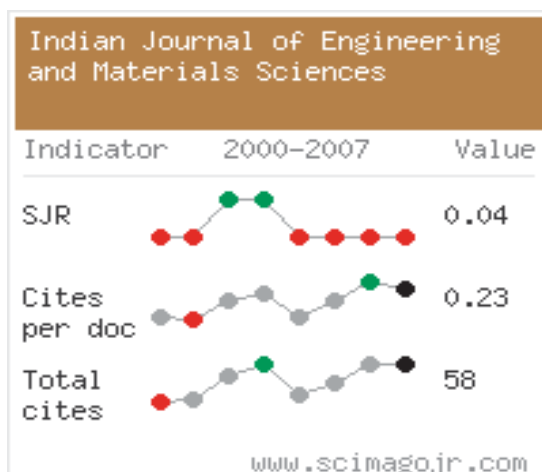
Objective

The objectives of the present study were to find out :

- Authorship pattern of cited documents
- Authorship pattern of citing documents
- Citations according to documentary form
- Percentage of Indian cited references.
- Percentage of Indian authors in citing articles.
- Comparison between journal self citation & total citation.
- Comparison between journal self citation and author self citation.
- Year-wise citation.

Scope

Present study was based on 1662 citations appended to 89 full length research articles published in the Indian Journal of Engineering and Materials Science (including special issue) in the period 2007-08. As such, on average, an article has almost 19 references.



Methodology

The citations appended to each article were scanned and tabulated by employing systematic sampling method. For each cited reference the following data was recorded and analyzed.

Table 1: Authorship patterns of citations (cited articles)

No. of Authors	No. of Citations	Percentage	Ranking
One	286	17.20	4
Two	341	20.51	3
Three	463	27.85	1
Four	409	24.60	2
Five	149	8.96	5
More than 5	14	0.84	6
Total	1662	100	

- Number of authors
- Type of document
- Origin
- Whether author self citation
- Whether journals self citation
- Year-wise distributed

For citing articles origin of authors, frequency and number of authors were also distributed.

Analysis and Interpretation of data

The data collected in order to fulfill the objective stated above was analyzed critically and presented in the following tables.

Table 1 summarizes break up of citations and ranking according to number of authors. It shows that single authored papers amount to 17.2%. Two-and-three-authored contributions is quite substantial in the field. A contribution by 5 or more authors totals almost 10% of the total contributions. Table 1 clearly indicates that three-and-four-authored contributions are most popular.

Table 2 indicates that journal articles top the list with 80.44% citations to their credit followed by monographs (11.79%) and conference papers (4.75%). The study revealed that authors preferred to refer mostly to the journal articles for support of their thought or preparation of a scholarly publication. Use of e-sources was least preferred by the authors.

Table 3 provides the citation of Indian and foreign documents. It was observed that out of 1662 citations, 1348(81.09%) were of foreign authors and remaining 314(18.87%) citations were of Indian authors. Citations according to form of documents showed that the journal citations of foreign authors were more than the Indian authors' citations. In case of monographs, citation of Indian authors was more than foreign authors. It is likely that higher number of foreign citations (specially journals) could be due to quality, standard, information content of foreign publication. In case of conference proceedings, thesis, preprint, Indian authors' citations were much more than foreign citation.

In case of citing articles, authorship patterns were found to be of three types (i) Indian (ii) foreign and (iii) mixed. In this study of 89 research papers, 69(77.5%) were by Indian

Table 2: Distribution of cited references according to form of documents

Sl No.	Type of Document	No. of citations	Percentage%	Rank
1	Journal article	1337	80.44	1
2	Monographs	196	11.79	2
3	Conference/ symposium / workshop etc.	79	4.75	3
4	Thesis & Dissertation	17	1.02	5
5	Preprints	24	1.44	4
6	Patents, Standards	4	0.24	7
7	E sources	5	0.30	6

Table 3: Ratio of Indian to foreign citation

Sl No.	Type of Document	No. of Indian Citation		No. of Foreign Citation		Ratio IC:FC
		Total	%	Total	%	
1	Journal article	103	6.19	1234	74.24	1:12
2	Monographs	119	7.16	77	4.63	1:0.65
3	Conference/symposium /workshop etc.	59	3.54	20	1.2	1:0.34
4	Thesis & Dissertation	12	0.72	5	0.3	1:0.42
5	Preprints	19	1.14	5	0.30	1:0.27
6	Patents, Standards	2	0.12	2	0.12	1:1
7	E sources	-	-	5	0.3	-
Total		314	18.87	1348	81.09	

Table 4: Authors self citations

No. Of Articles	Total Citations (TC)	Author Self Citation (ASC)	% of Author Self Citation	ASC:TC
89	1662	155	9.33	1:11

Table 5: Journal self citations

No. Of Articles	Total Citations (TC)	Journal Self Citation (JSC)	% of Journal Self Citation	JSC:TC
89	1662	6	0.36	1:17

Table 6: Comparison between journal self citation and author self citations

No. Of Articles	Total Citations (TC)	Journal Self Citation (JSC)	Author Self Citation (ASC)	% of JSC	% of ASC	JSC:ASC
89	1662	6	155	0.36	9.33	1:26

Table 7: Year-wise journal citations

Period	Total Citation	% of Citation
1911-20	2	0.12
1931-40	3	0.18
1941-50	12	0.72
1951-60	24	1.44
1961-70	67	4.09
1971-80	123	7.4
1981-90	237	14.25
1991-2000	542	32.61
2001-08	652	39.22
Total	1662	

authors, 17(19.1%) by foreign authors and 3(3.37%) by mixed authorship. It may be due to the popularity, circulation, prestige, standard of the journal in international circle being quite low compared to the high impact journals in the field. The results indicate that 25.84% articles published in these issues (Citing Articles) were three authored followed by four-authored (23.59%) articles, two-authored articles (22.47%). Out of 263 authors, 203 authors were of Indian origin (77%).

Present study identify 155 author self citations that accounts for 9.33% of the

citation. The ratio of author self citation to total citation was 1:11.

Journal self citation is an important bibliometric indicator that gives an indication about the popularity of the journal among its contributors as well as the user community. The percentage of self citation of many reputed journals of the world was found to be over 20%⁽⁸⁾. The study indicated 6 out of total citations comprising 0.36% which is lower as compared to the percentage of JSC of internationally reputed journals.⁽⁸⁾

The ratio of JSC and ASC is a good indicator for the quality of journal. Table 6 summarizes 0.36% of JSC and 9.33% ASC which accounts for the ratio of 1:26. The low percentage of journal self citation reveals that the journal is not so much popular among its contributors and user community or it does not convey quality work of good standard.

Table 7 reveals year-wise journal citations. It is noted that the period 2001-08 and 1991-2000 had the highest 652(39.22%) and 542(32.61%) citations respectively. The maximum number of citations were done in these periods. It is clear that a majority of documents cited in these issues were published not more than 20 years ago.

Conclusion

On the basis of the analysis, it is revealed that the journal carried articles mostly of group research. Contributors have cited maximum number of foreign authors/ researchers in their respective papers. The percentage of journal self citation is low indicating that journal may not be so much popular among its user community. In SJR ranking in India, Indian Journal of Engineering and Materials Science ranked second only after Sadhana Academy Proceedings in Engineering Science with SJR(0,041) and H Index 9 in the year 2007 and its Impact Factor is 00.272⁽⁹⁾. It is worth mentioning that the journal is hardly a

decade old and sponsors have ample scope for improving its quality and standard in order to become a reputed journal in the field of engineering.

Reference

1. Das Anup Kumar and Sen B K. Journal of Bio science: an analysis of citation pattern. *Annals of Library and Information studies* 2001; 48(2): 59-63.
2. <http://www.jntu.ac.in/notif-01096/Feb/Enggrevjo.doc>. (Visited on: June 12, 2009)
3. Kalayane V L and Sen B K. A Bibliometric Study of the journal of Oilseeds Research. *Annals of Library Science and Documentation* 1995; 42(4): 121-141.
4. Koley Susanta and Sen B.K. Indian Journal of Physiology and Allied Sciences. *Annals of Library and Information studies* 2003; 50(1): 23-26.
5. Leong Siew Meng. A Citation Analysis of the Journal of Consumer Research. *Journal of Consumer research* 1989; 492.
6. Mccain Katherine W and Bobbick James E. Patterns of Journal use in a Departmental Library: A citation Analysis. *Journal of American Society for Information Science* 2007; 32(4): 257-67.
7. Shokeen Ashu and Kaushik Sanjay K. Indian Journal of Plant Physiology: A Citation Analysis. *Annals of Library and Information studies* 2004; 51(3): 104-07.
8. Singh Neena and Dominic J. An Analysis of Citation of Allelopathy Journal: A case Study. *IASLIC Bulletin* 2006; 51(1): 37-41.
9. SCImago. (2007). *SJR-SCImago Journal & Country Rank*. Retrieved July 03, 2009, from <http://www.scimagojr.com>.
10. Smith Linda C. Citation Analysis. *Library Trends* 1981; 30(1): 83-88.
11. Stigler Stephen M. Citation patterns in the Journals of Statistics and Probability. *Statistical Science* 1994; 9(1): 94-108.
12. Vijay K R and Raghavan I. Journal of Food Science and Technology: A Bibliometric Study. *Annals of Library and Information studies* 2007; 54(4): 207-12.