University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Library Philosophy and Practice (e-journal) | Libraries at University of Nebraska-Lincoln

Spring 2019

Cited and citing pattern of Indian Journal of Pure and Applied Mathematics: An evaluation

Ajay Kumar Chaubey Mr.
Department of Libaray and Information Science, Banaras Hindu University, Varanasi, ajaybhu21@gmail.com

Follow this and additional works at: https://digitalcommons.unl.edu/libphilprac

Part of the Library and Information Science Commons

Chaubey, Ajay Kumar Mr., "Cited and citing pattern of Indian Journal of Pure and Applied Mathematics: An evaluation" (2019). *Library Philosophy and Practice (e-journal)*. 2200.
https://digitalcommons.unl.edu/libphilprac/2200

Cited and citing pattern of Indian Journal of Pure and Applied Mathematics: An evaluation

Ajay Kumar Chaubey
Junior Research Fellow
Department of Library and Information Science
Banaras Hindu University, Varanasi-221005
Email:ajaybhu21@gmail.com

Abstract:
This paper examines the cited and citing pattern of Indian Journal of Pure and Applied Mathematics (IJPAM) in terms of source, authorship, subject diversity, accessibility, citation-age, quantity & citing-life. This study is based on the data collected from 5 Volumes, consisting of 30 issues, carrying 171 articles, citing 2754 references from 575 citing sources of IJPAM published from 2009 to 2013. Whereas for collecting cited references, every published article from the official website of the journal namely Indian National Science Academy (INSA) was downloaded, for citing references, Google Scholar and Scopus both were explored to recognize the maximum number of citing sources during October 2017.The study revealed that journal articles are the most cited references, whereas citing references are mostly from the journals of foreign origin. Majority of cited articles are available in non-open access form, though the citations came from both, open and non-open journals. Joint authorship was found to be predominant, in both cited-citing references.

Keyword: Citation, Cited - Citing, Coupling, Co-citation pattern, Indian Journal of Pure and applied mathematics, References.

Introduction:

Journals are considered to be primary means of communication among researchers for their R&D activities It is essential to know the cited-citing pattern and current trends etc. of journals. Citing literature is a common usage among researchers. It portrays the relationship between the citing document and the cited document and also contributes to the reader's understanding of the process of scientific communication [1]. Publishing of articles is a crucial form of scholarly publications in all disciplines.

Indian Journal of Pure and Applied Mathematics: An overview

The Indian Journal of Pure and Applied Mathematics (IJPAM) is published by the Indian National Science Academy (INSA). IJPAM is one of the prestigious journals in the field of mathematics, devoted to primary research in all areas of Pure and Applied Mathematics, Statistics and other related areas. The journal started as quarterly publication in 1970 but changed its frequency to monthly from 1973. It became bimonthly in 2006 and later as quarterly

in 2016. IJPAM is indexed in Science Citation Index, Mathematical Review, Current Content and INSPEC Science Abstract. Since 2010 IJPAM has co-published with Springer (India) Pvt. Ltd [2]. Over the years, the reference citation of the journal has increased globally.

Literature Review:

Very few studies have attempted to make an assessment of scientific publications of mathematics journals. Lipetz (1965) utilized 29 indicators to code the relationship between citing and cited papers to improve the effectiveness of information retrieval [3].Garfield (1980) analyzedthe influence of Merton, an eminent sociologist, on the basis of articles citing his publications in the social sciences except sociology, which accounted for 56 % of the total number of citing articles, followed by sociology articles (36 %) and natural sciences articles (8 %) [4].Hargens (2000) used two methods namely, reference network and citation context analysis to examine differences in the structure of scholarship among seven research areas in the natural sciences, social sciences, and the humanities [5]. Mukherjee, B. (2009) examined the pattern of cited citing hyperlinked references of 17 open access journals of library and information science. They found that 162 articles do not have any cited references while remaining 1474 articles have an average of 23.7% references per articles [6].Narang, A. (2004) evaluated the Indian Journal of Pure and Applied Mathematics, where they found that journals are more preferred choice of cited sources among authors of mathematics [7]. Shokeen and Kaushik (2004) conducted the citation analysis on Indian Journal of Plant Physiology, wherein they found that 81. % journal articles and 14% books are cited. 39% of citing articles are three-authored, whereas 26% are two authored. Most of the cited articles in these issues were published not more than twenty years ago [8]. Chaubey and Mukherjee (2018) assessed the cited and citing pattern of open Access Journals in Physics, Chemistry and Mathematics. It was found that journals are predominant cited and citing sources in physics, chemistry and mathematics disciplines. Of the total 2799 cited source in physics, and 3918 cited sources in chemistry, almost 68% and 74%, respectively, was close access. Whereas in mathematics the trend was different, share of open and non-open access cited sources were almost same, i.e. 49% and 50%, respectively. Approximately 90% citations of physics-chemistry and 68% citations of mathematics disciplines came after two years of publication [9].

Objective:

- To trace out the cited-citing references in terms of source, authorship, subject diversity and accessibility.
- To find out the citation characteristics in terms of citation-age, quantity & citing-life

Method of Study

The present study is designed to evaluate the cited-citing references pattern of Indian Journal of Pure and Applied Mathematics (IJPAM) from the period of 2009 to 2013.Cited references download from the official website of INSA. Whereas, for citing references, explore from

Google Scholar and Scopus of citing source to identify the number of citing sources. Each article title was searched in Google Scholar and Scopus to find the maximum number of web citations (citing references) it had received, the result with the highest number of web citations was taken for further analysis. Each article was analyzed to record the details of the title, sources, authorship, number of references for each article, type of references, citation age, citing life and accessibility etc. The present study consists 5 Volumes, 30 issues, 171 articles, 2754 cited references and 575 citing references.

Result and Discussion

Figure: 1. Overview of cited-citing articles/references

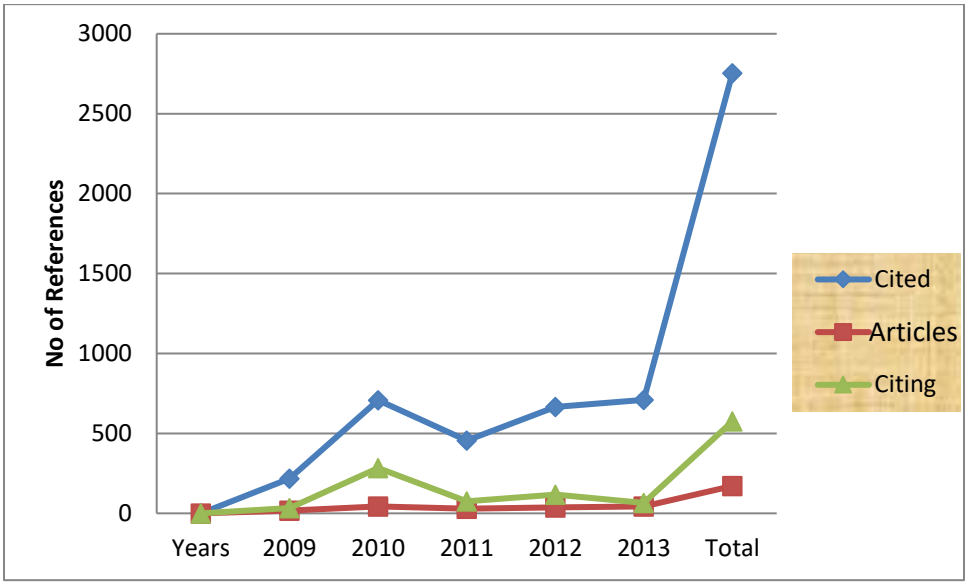


Figure 1 represents the total no. of cited –citing references and articles. As indicates in above 2010 received 49.21% maximum citation while 2010 and 2013 contained 25.14% maximum articles. In 2009 received both 5.91 % minimum citation and contained 9.94% minimum articles.

Table: 1

Characteristics of Output in IJPAM journal

Years	No. of Articles	Article/ Issue	No. of Cited References	Cited References/ Article	No. of Citing References	Citing Reference/Article
2009	17	3.4	217	12.76	34	2
2010	43	7.16	707	16.44	283	6.58
2011	30	5.00	455	15.16	75	2.5
2012	38	6.33	666	17.52	117	3.07
2013	43	7.16	709	16.48	66	1.53
Total	171	28.5	2754	16.10	575	3.36

Table 1 reveal Overall published articles in IJPAM contained 28.5 articles per issue while 16 references per article and received 3citations per articles. In 2012 cited reference per articles were highest (17.52) while 2010 received highest citation per paper (6.58), however in citing references per articles were 3.36. Whereas IJPAM obtained highest citing reference per articles in 2010 and obtained lowest citing reference per articles in 2013.

Table: 2

Authorship pattern of cited-citing literature

Year	Cited					Citing				
	Solo	%	Joint	%	Total	Solo	%	Joint	%	Total
2009	108	49.76	109	50.23	217	15	41.66	21	58.33	36
2010	306	42.67	411	57.32	717	115	40.35	170	59.64	285
2011	191	41.97	264	58.02	455	25	32.89	51	67.10	76
2012	303	45.49	363	54.50	666	25	21.18	93	78.81	118
2013	297	41.88	412	58.11	709	22	33.33	44	66.66	66

Tables 2 represent the authorship pattern of cited-citing literature in IJPAM. As indicated in the table both for cited-citing literature solo authorship were highest in 2009. On other hand, for cited literature joint authorship were highest (58.11%) in 2013, however for citing literature joint authorship were highest (78.81%) in 2012. The joint authorship were predominant in cited and citing literature. Similar trends are noted in authorship pattern cited-citing literature in IJPAM.

Table: 3

Cited-Citing references pattern according to sources of publication

Forms of Cited-Citing Source	Cited										Citing									
	2009		2010		2011		2012		2013		2009		2010		2011		2012		2013	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
JR	163	74.42	479	67.47	353	77.41	483	72.63	520	73.23	28	82.35	221	78.09	53	70.66	90	76.92	55	83.33
Bk	39	17.80	136	19.26	76	16.66	108	16.24	124	17.46	4	11.76	2	0.70	3	4.00	1	0.85	1	1.51
CP	11	5.02	56	7.93	14	3.07	39	5.86	35	4.92	1	2.94	9	3.18	1	1.33	3	2.56	1	1.51
TH/DS	-	0	8	1.13	3	0.65	5	0.75	6	0.84	-	-	9	3.18	3	4.00	1	0.85	5	7.57
Others	06	2.73	27	3.82	10	2.19	30	4.51	25	3.52	1	2.94	42	14.84	15	20.0	22	18.80	4	6.06

Total	219	99.97	706	99.61	456	99.98	665	99.99	710	99.97	34	99.99	283	99.99	75	99.99	117	99.98	66	99.91

Note: JR= Journals, Bk= Books, CP= Conference Proceedings, TH/DS= Thesis/Dissertation and N= Numbers of articles.

Table 3 reveals the pattern of cited-citing reference according to source of citation. As indicated in table 3 journals are the most preferred information sources of citation. This finding is similar with the findings of Glanzel & Schoepflin (1999) where they found that mostly journal articles as references to serials nearly 80% deal with the sciences. Books are second preferred choice of cited - citing sources among researcher of mathematics [10]. Conference proceeding are third preferred choice of researcher in cited sources while citing sources thesis/dissertation are third preferred choice of researcher in mathematics. In mathematics authors cite (19.26%) books in 2010, (17.80%) books in 2009 while writing their articles. On other hand, articles in mathematics also receive considerable number of citations (11.4%) from books in 2009 after journal articles.

Table: 4

Cited-Age of Cited references

Year	Before 5 Year	% Share	Within 5 Year	% Share	Total
2009	183	84.33	34	15.66	217
2010	620	87.69	87	12.30	707
2011	380	83.51	75	16.48	455
2012	518	77.77	148	22.22	666
2013	585	82.51	124	17.48	709

Table 4 shows the cited age of cited reference of IJPAM. Of the total 707 articles authors cited most of the articles i.e. 87.69% in 2010 that were published before five or more years old. On other hand22.22% or 666 cited articles were published within five years in 2012.The result of the present study is quite different from the findings Cole's (1983) examine the citation of the journals of seven disciplines (biochemistry, chemistry, geometry, mathematics, physics, psychology, and sociology) found that whereas 55 to 62% of the citations in physics, biochemistry, and chemistry were works published within 5 years [11].

Table: 5

Pattern of the cited-citing source according to the origin of articles

	Cited					**Citing**				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
%age of articles by Indic origin	17.64	48.83	30	15.78	37.20	20.58	9.89	16	3.81	12.12
%age of articles by Foreign origin	82.34	51.16	70	84.21	62.79	79.41	90.01	84	96.18	87.87

Table 5 display the pattern of cited-citing sources according to origin. We considered an article is of Indian origin in case of the first or all of its authors belongs to an Indian organizations / institution's etc.; and we considered an article is of foreign origin in case of first or all of its authors belongs to some organizations/ institutions etc. situated outside India. It was noticed that whereas authors wrote their article they generally cite article that were of foreign origin and their articles also receive citations mostly from articles that were of foreign origin. In the year 2012 almost 84.21% cite foreign origin while their works are also received the almost 96.18% citation from foreign origin in 2012.

Table: 6

Pattern of cited-citing references according to access policy

	Cited					**Citing**				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
%age of the article available in open access	49.27	6.30	6.15	3.94	8.46	47.05	40.31	46.66	40.17	43.93
%age of the article available in non-open access	50.27	93.69	93.84	96.05	91.53	52.94	59.68	53.33	59.82	56.06

Table 6 reveals the pattern of cited-citing sources according to their access policies. The proportion of open and non-open access cited sources were almost same, i.e. 49% and 50%, respectively in 2009. For citing source, it was observed that the proportion of open and non-open access citing source in were almost equal in 2009.The mostly cited-citing sources are not freely accessed.

Figure: 2.Age of open access vs non open access in cited-citing articles

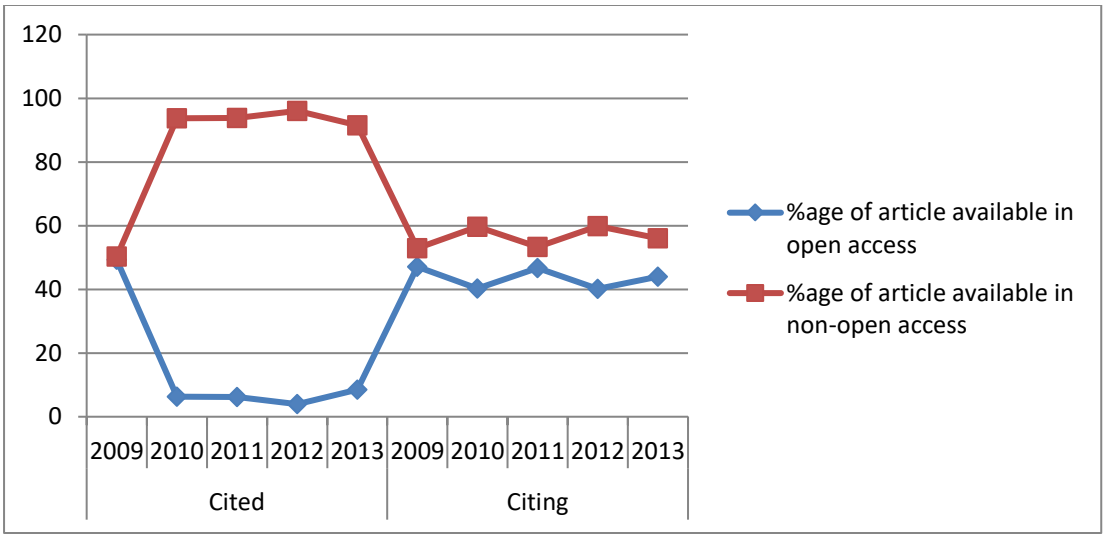


Figure 2 show that cited and citing articles are available mostly non open access form.

Table: 7

Pattern of cited-citing references according to subject coverage of citations

	Cited					Citing				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Within-Subject field	88.94	87.87	88.36	84.13	79.43	79.10	87.18	90.66	88.03	81.53
Other Than the concerned subject	8.29	4.65	4.68	4.34	2.81	5.88	1.42	2.66	0.85	00
Multidisciplinary subjects	2.76	7.33	6.95	11.52	17.74	14.70	11.38	6.66	11.11	18.46

Table 7 presents that while authors write their article they mostly cite earlier work of their own field mathematics. In 2009 IJPAM authors cited mostly published articles (88.94%) their work in mathematics followed by 2011 (88.36%), 2010 (87.87%), 2012 (84.13%) and 2013 (79.1%) their own work in mathematics. Furthermore, authors of IJPAM cited a considerable number of articles multidisciplinary subject 2013 (17.74%), 2012(11.52%). On other side, articles of IJPAM author received almost citation 2011 (90.66%), 2012 (88.03%), 2010 (87.18%) from their subject field.

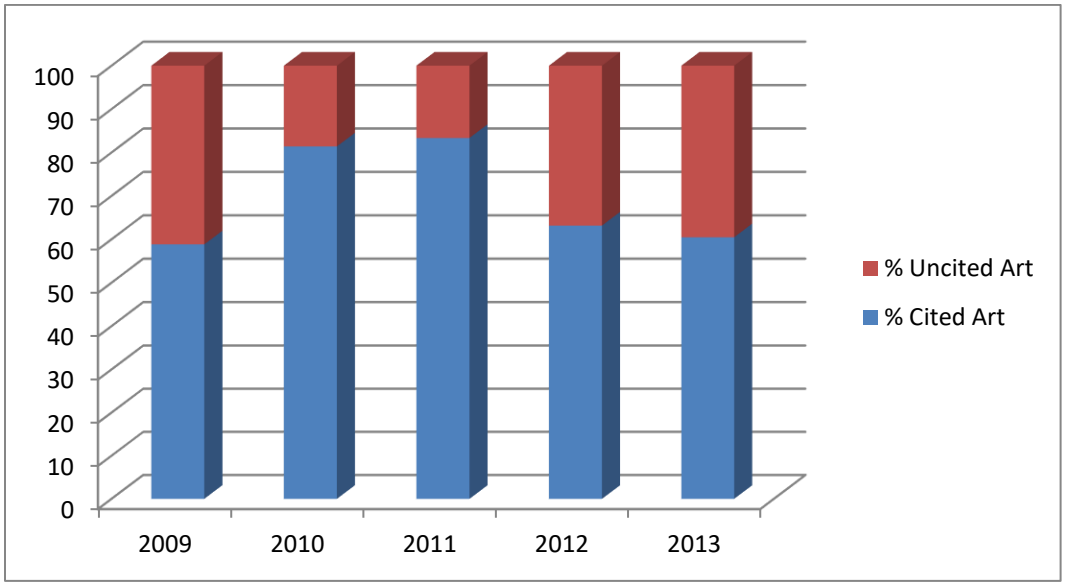
Table: 8 (A)

Quantity of citing references

Subject	Total citation received	Citation / Article	% Uncited articles
2009	34	2	41.17
2010	283	6.58	18.60
2011	75	2.5	16.66
2012	117	3.07	36.84
2013	66	1.53	39.53

Table 8(A) analyzed the total citations, citation per articles and uncited articles. It was observed that IJPAM received highest citation 283 in 2010 and lowest 34 citations received in 2009. Citation per article is highest 6.58 in 2010 while lowest citation per article is 1.53 in 2013. Highest uncited articles 41.17 % in 2009 while lowest uncited articles 16.66 % in 2011 in given year.

Figure:3. Percentage of cited vs uncited articles in cited-citing literature



Note: Art=Articles

Figure 3 reveals that cited articles and uncited articles. 2011 received maximum citation while 2009 received minimum citation.

Table: 8 (B)

Citing life of citing references

Year	Y1	%	Y2	%	Y5	%	total
2009	4	11.76	7	20.58	23	67.64	34
2010	15	5.41	30	10.83	232	83.75	277
2011	4	5.33	7	9.33	64	85.33	75
2012	10	8.69	21	18.26	84	73.04	115
2013	7	10.44	12	17.91	48	71.64	67

Whereas Y1=Year of Publication, Y2=Y1+1, Y5=Next five years of Y2

Table 8(B) represents the citing life of references that the minimum time requires to receive substantial number of the citations of IJPAM is more than two years. Almost 85.33% and 83.75 % citation came after two years.

Conclusion:

The present study concludes the relationship between cited-citing patterns of IJPAM. Therefore outputs based analysis of IJPAM and address the issues including source, authorship, subject diversity, accessibility, citation age and citing life. This study may be explained in the age of

internet still peer-reviewed journals are the most preferred choice. This study also explains performing research multiple authorship and citing foreign origin literature in IJPAM is common practice in these days. Whereas authors in IJPAM publish mostly journal articles and publish a significant quantity of books and Conference proceedings. However, research also has shown that authors cite more journal articles than books and found a tendency to use literature published before 5 years or even later. Citing references to IJPAM were more than two years later of publication. These may indicate that the research output of this journal does not necessarily generate immediate impact within 1 to 2 years of its publication. However, we observed that almost cited source of this journal was not accessible freely. This may be suggesting that in citation depends on the relevancy of literature, not on access type.

Reference:

1. Chang, Y. W. (2013). A comparison of citation contexts between natural sciences and social sciences and humanities. Scientometrics, 96(2), 535-553.
2. About Indian Journal of Pure and Applied Mathematics. Retrieved from : http://insa.nic.in/UI/journaldetails.aspx?AID=Mg (accessed on 25 October 2018)
3. Lipetz, B. A. (1965). Improvement of the selectivity of citation indexes to science literature through inclusion of citation relationship indicators. American documentation, 16(2), 81-90.
4. Garfield, E. (1980). Citation measures of the influence of Robert K. Merton. Transactions of the New York Academy of Sciences, 39(1 Series II), 61-74.
5. Hargens, L. L. (2000). Using the literature: Reference networks, reference contexts, and the social structure of scholarship. American sociological review, 846-865.
6. Mukherjee, B. (2009). The hyperlinking pattern of open-access journals in library and information science: A cited citing reference study. Library & Information Science Research, 31(2), 113-125.
7. Narang, A. (2004). Indian journal of pure & applied mathematics: a bibliometric study. *Annals of Library and Information Studies*, 51(1), 28-38
8. Shokeen, A., & Kaushik, S. K. (2004). Indian Journal of Plant Physiology: a citation analysis. 51(3) 104-107.
9. Chaubey, A. K., & Mukherjee, B. (2018). Cited and Citing Pattern of Open Access Journals: A Pilot Study with Selected Indian Journals of Physics-Chemistry-Mathematics. SRELS Journal of Information Management, 55(1), 13-19.
10. Glänzel, W., & Schoepflin, U. (1999). A bibliometric study of reference literature in the sciences and social sciences1. Information processing & management, 35(1), 31-44.
11. Cole, S. (1983). The hierarchy of the sciences?. *American Journal of Sociology*, *89*(1), 111-139.