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A Scientometric analysis of "Indian Journal of Pure and Applied Physics" (2006-2010): A study based on Web of Science

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Abstract

The present study deals a scientometric analysis of 657 papers published in the journal "Indian Journal of Pure and Applied Physics" during the period 2006 to 2010. Data is collected using the Web of Science and analyzed using Microsoft Excel. The study focuses on various aspect of the journal such as document types, growth of papers (year wise), authorship pattern, institutions involved, citation analysis, most prolific authors of the journal, mean page length and number of references. The study shows that most of the papers (93.46%) were contributed jointly where as 6.54% papers were contributed by single authors. CSIR topped in the institution list. Overall average citation per paper was 1.87 where as overall mean page length of all the paper was 5.37. All the studies will be helpful for its further development.

Keywords: Scientometric analysis, Indian Journal of Pure and Applied Physics, citation.

Introduction

Scientometrics is a branch of the science 'Science of Science'. Haitun treats 'Scientometrics', as scientific disciplines, which performs reproducible measurements of scientific activity[1]. Now a day's scientometrics is one of the truly interdisciplinary research fields extended to almost all scientific fields. Scientometrics applications are used to measure scientific activities, mainly by producing statistics on scientific publications indexed in databases.

These applications are extremely valuable methods for evaluating research output, to know about the author productivity and citation analysis in science and technology. Scientometric tools can be used to measure and describe countries, universities, research institutes, journals, specific research topics and specific disciplines. This paper focuses on quantitative study of "Indian Journal of Pure and Applied Physics" by applying simple scientometric techniques.

Literature Review: The terms bibliometrics and scientometrics are used almost simultaneously introduced by Pritchard and by Nalimov and Mulchenko in 1969. Pritchard explained the term bibliometrics as "the application of mathematical and statistical methods to books and other media of communication"[2]. Nalimov and Mulchenko defined scientometrics as "the application of those quantitative methods which are dealing with the analysis of science viewed as an information process"[3].

A number of bibliometric and scientometric studies have been done during the last three decade to evaluate the research productivity of science discipline journals in terms of author productivity, growth of literatures, their publication output and in citations study.

Uzun (2004) studied about the pattern of foreign authorship of articles in 5 leading journals in the field of information science and scientometrics[4].

A similar bibliometric study has been done by Singh, J.K[5] in 2012 for "Libri Journal" during the period 2001 to 2009. In his study of 221 papers published by the year 2001-2009 in "Libri Journal", he showed that maximum numbers of contributions are single author with 124 papers (56.10%). Indian contributions in this journal are significantly less (1.87%).

A scientometrics analysis of 829 articles published in "Indian Journal of Physics" has also been done by Nattar, S during by the year 2004 to 2008. In his study he showed that highest numbers of papers were written by co-authors and contributions of paper in this journal from India is slightly more than from other foreign countries[6]

Rattan, G. K. and Gupta, K. (2012) studied the journal "Malaysian Journal of Library and Information Science: 2007-2011" bibliometrically. In their study, they showed that out of 100 articles, single authors contributed 27 (27%) articles while the rest 73 (73%) articles are contributed by joint authors. They also showed that about 62.54% of citations were from periodicals[7].

Source Journal: "Indian Journal of Pure and Applied Physics" is published from Council of Scientific and Industrial Research, National Institute of Science Communication and Indian National Science Academy. It published monthly. This journal publishes Original Research Contribution as full papers, notes and reviews on classical and quantum physics, relativity and gravitation; statistical physics and thermodynamics; elementary particles and fields, nuclear physics, atomic and molecular

physics, fundamental area of phenomenology, optics, acoustics and fluid dynamics, plasmas and electric discharges, condensed matter-structural, mechanical and thermal properties, electronic, structure, electrical, magnetic and optical properties, geophysics, astrophysics and astronomy. Journal's impact factor was 0.763 in the year 2011.

Objectives of the study: The major objectives of the present study covering the "Indian Journal of Pure and Applied Physics" during the period 2006-2010 are i. To find out the document types (Publication culture) and year wise contribution of papers. ii. To study the authorship pattern of the papers. iii. To indicate institution wise contribution of the papers. iv. To examine the number of citation received. v. To find out the most prolific author of the journal. vi. To find out the length of paper and number of references.

Methodology

The data presented in this paper have been accessed from Web of Science published by Thomson Scientific. The basic data relating to total publications during 2006-2010, has been collected in the month of January 2013 using Web of Science. The search strategy used for collecting data for Indian Journal of Pure and Applied Physics was as follows: "Publication Name = INDIAN JOURNAL OF PURE and APPLIED PHYSICS; Publication Year=2006-2010; Address= India". All the searched results were saved in text files and then imported into Micro Soft-Excel to organize, analyze and generate the tables, graphs and charts for final study.

Publication Culture: Table 1 shows that journal articles were the most prominent form of the communicating research results. Majority of contributions had been done in the form of journal's articles with 640 contributions (97.41%) followed by editorial materials with 12 contributions (1.82%) and review paper with 5 contributions (0.76%). It is also shown in Figure-1.

Table-1
Indian Journal of Pure and Applied Physics (2006-2010): No of items published (All type)

Type of items	No of items published	% of 657
Article	640	97.41
Editorial Material	12	1.82
Review	5	0.76
Total	657	100

Year wise distribution of papers: Table 2 shows the distribution of papers in "Indian Journal of Pure and Applied Physics" by the year 2006-2010. The journal published 657 papers during the period 2006-2010.The highest number of papers were published in the year 2007 contributing 144 papers (21.918%) followed by 143 papers (21.766%) in the year 2006, 131 papers (19.939%) in 2008 and 126 papers (19.178%) in 2010. The minimum (113 papers) numbers of papers (17.199%) were published in the year 2009. it is shown in Figure 2.

Results and Discussion

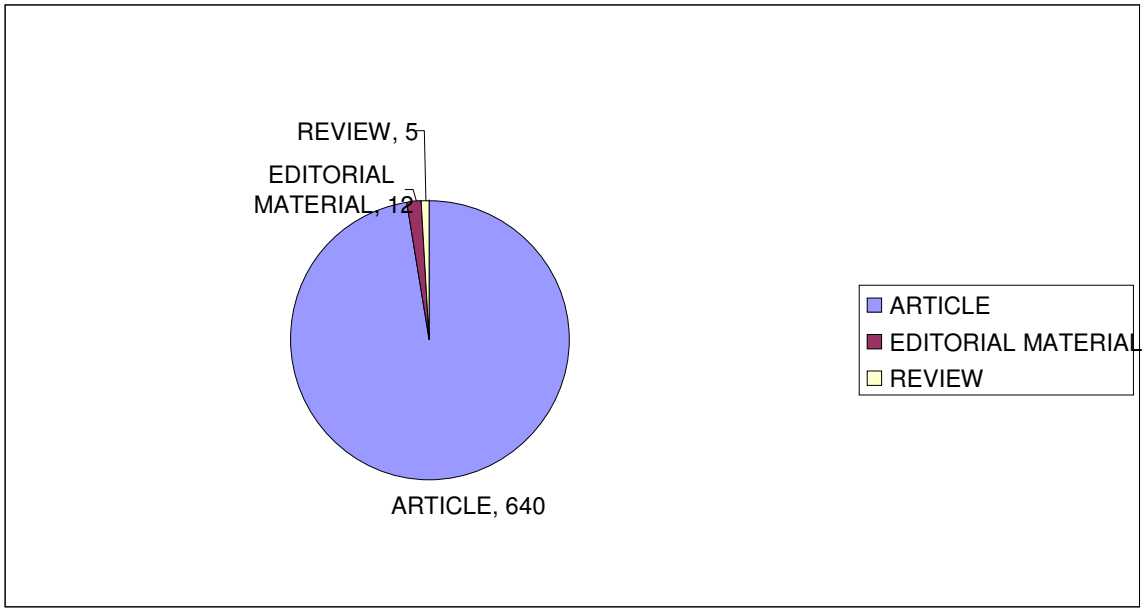

Figure- 1
Indian Journal of Pure and Applied Physics (2006-2010): No of items published (All type)

Table-2
Year wise distribution of papers

Year	Volume	No. of Papers	% of 657
2006	44	143	21.766
2007	45	144	21.918
2008	46	131	19.939
2009	47	113	17.199
2010	48	126	19.178
Total	**5 Years/5 Vol.**	**657**	**100**

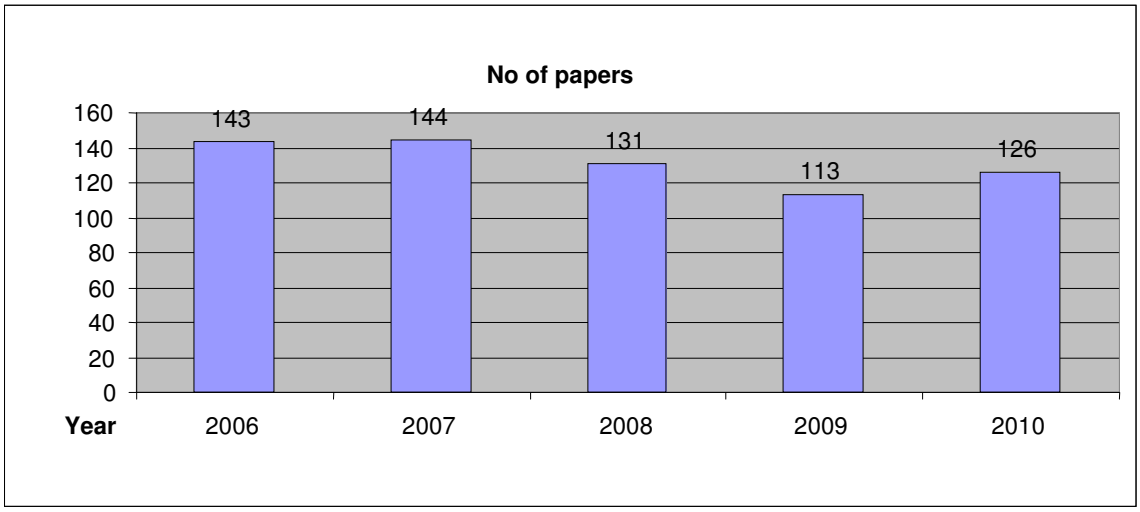

Figure-2
Year wise distribution of papers

Table-3
Authorship pattern in published papers by the year (2006-2010)

Authors	Year					No. of Papers	%
	2006	2007	2008	2009	2010		
Single Authors	4	12	8	8	11	43	6.54
Two Authors	34	32	38	43	27	174	26.48
Three Authors	46	29	30	23	34	162	24.65
Four Authors	36	42	32	14	21	145	22.07
Five Authors	14	12	11	14	17	68	10.35
Six Authors	7	8	9	8	7	39	5.93
Seven Authors	-	2	1	3	7	13	1.97
Eight Authors	1	2	1	-	2	6	0.91
Nine Authors	1	3	1	-	-	5	0.76
Ten Authors	-	-	-	-	-	-	-
Eleven Authors	-	-	-	-	-	1	0.15
Twelve Authors	-	-	-	-	-	-	-
Thirteen Authors	-	1	-	-	-	1	0.15
Total	**143**	**144**	**131**	**113**	**126**	**657**	**100**

Authorship pattern: Table 3 shows the authorship pattern of the papers published during the period of study. Out of 657 papers the maximum number of papers 174 (26.48%) had been contributed by two authors.

This is followed by three authors with 162 papers (24.65%), four authors with 145 papers (22.07%), five authors with 68 papers (10.35%), single authors with 43 papers (6.54%), six authors with 39 papers (5.93%), seven authors with 13 papers (1.97%), eight authors with 6 papers (0.91%) and nine authors with 5 papers (0.76%). One paper (each) was contributed by 11 authors and 13 authors during the year 2006-2010.

The table-4 shows that out of 657 papers single author contributed 43 papers (6.54%) while the rest 614 papers (93.46%) were contributed by joint authors. This is also shown in figure-3.

Table-4
Authorship pattern in published papers by the year (2006-2010)

Authorship Pattern	Year					Total	%
	2006	**2007**	**2008**	**2009**	**2010**		
Single	4	12	8	8	11	43	6.54
Joint	139	132	123	105	115	614	93.46
Total	**143**	**144**	**131**	**113**	**126**	**657**	**100**

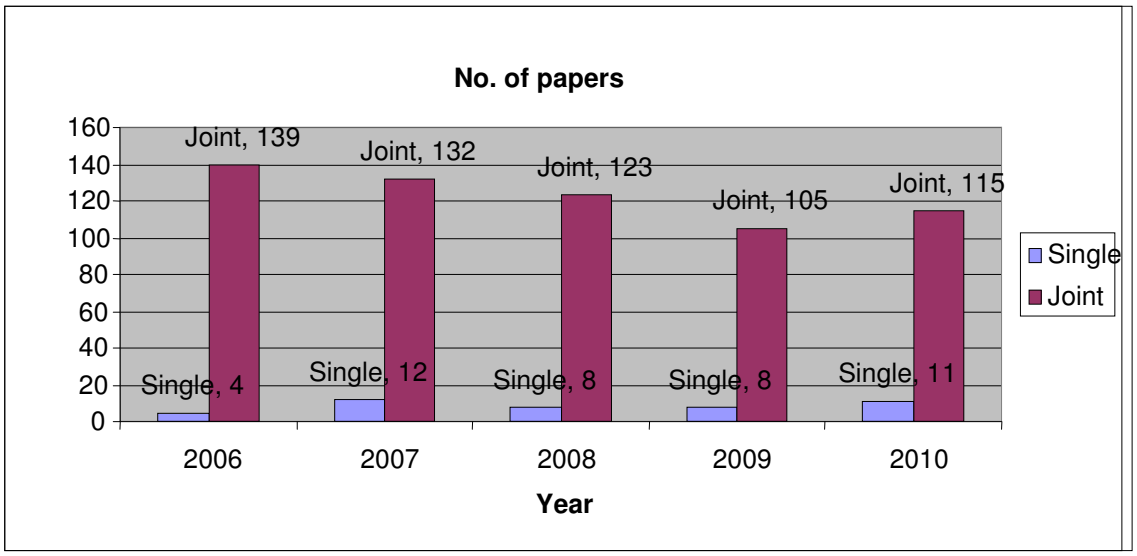

Figure-3
Authorship pattern in published papers by the year (2006-2010)

Degree of collaboration: The degree of collaboration is calculated by K. Subramanyam formula.
C=NM/NM + NS

Where C=Degree of collaboration, NM=Numbers of multi authored papers, NS=Numbers of single authored paper
In the present study the degree of collaboration is C=614/614+43 =614/657 =0.934

Institution wise contribution of the papers: Table 5 provides rank list of top 16 institutions. Council of Scientific Industrial Research CSIR topped in the rank list with 54 publications followed by IIT with 50 publications. Banaras Hindu University, Panjab University and University Kashmir have 16th position with 8 publications each.

Citation analysis: Table 6 reveals that out of 657 papers published in "Indian Journal of Pure and Applied Physics" during the period 2006-2010 received 1229 citations. Papers published in 2007 received the highest number of citations with 291 citation (23.67%), followed by 282 citations (22.94%) in 2006, 234 citations (19.03%) in 2008, 220 citations (17.90%) in 2009 and 202 citations (16.43%) in 2010. Overall, the average number of citation per paper was 1.87.

Most prolific authors of the journal: Table 7 shows the productivity of authors. A rank list of authors is prepared by considering the contributions of papers published in this journal.

The most prolific author was Kumar, R who topped in the author list with 21 papers followed by Kumar, A with 20 papers (2nd rank), Sonkawade, RG with 18 papers (3rd rank), Gunasekaran, S with 16 papers (4th rank), Saxena, NS with 14 papers (5th rank), Kumar, S with 13 papers (6th rank), Prasad, R with 12 papers (7th rank) and Sanyal, SP with 11 papers (8th rank). Three authors ranked at 9th position with 10 papers each. Three other authors ranked at bottom position (10th rank) with 9 papers each.

Page Length of Papers and Mean Page Length: Table 8 shows page range and mean page length of papers published during the period 2006-2010 in the journal "Indian Journal of Pure and Applied Physics". Out of 657 papers, 394 papers (59.96%) had between 1 to 5 pages, 246 papers (37.44%) had between 6 to 10 pages and 16 papers (2.43%) had between 11 to15 pages. There was only one paper (0.15%) with page range 16 to 20.The arithmetic mean of page length of all papers ranges from 5.22 to 5.48. The mean page length was highest (5.48) in the year 2006 and lowest (5.22) in the year 2008. Overall, the mean page length of all the papers published during the year 2006 to 2010 is 5.37.

Table- 5
Institution wise distribution of the papers (Top 16 Institutions)

S. No	Institution	Records	% of 657	Rank
1	Council of Scientific Industrial Research CSIR India	54	8.219	1
2	Indian Institute of Technology IIT	50	7.61	2
3	Univ Rajasthan	33	5.023	3
4	National Physics Laboratory India	31	4.718	4
5	Natl Inst Technol	24	3.653	5
6	Maharaja Sayajirao University Baroda	23	3.501	6
7	Bhabha Atomic Research Center	21	3.196	7
8	Annamalai Univ	20	3.044	8
9	Aligarh Muslim University	15	2.283	9
10	Indian Institute of Technology IIT Roorkee	15	2.283	9
11	Barkatullah Univ	14	2.131	10
12	Inter Univ Accelerator CTR	14	2.131	10
13	Pachaiyappas COLL	14	2.131	10
14	Himachal Pradesh Univ	13	1.979	11
15	Jadavpur University	13	1.979	11
16	Gauhati Univ	12	1.826	12
17	Hnb Garhwal Univ	11	1.674	13
18	Osmania University	11	1.674	13
19	Gujarat Univ	10	1.522	14
20	Indian Institute of Technology IIT Delhi	10	1.522	14
21	Presidency COLL	10	1.522	14
22	Sardar Patel University	10	1.522	14
23	Sri Venkateswara University	10	1.522	14
24	Kurukshetra Univ	9	1.37	15
25	Banaras Hindu University	8	1.218	16
26	Panjab Univ	8	1.218	16
27	Univ Kashmir	8	1.218	16

Table-6
Indian Journal of Pure and Applied Physics (2006-2010): Papers published, By Citation Pattern

Year	Papers	Total Citations	% of Total	Average No of Citation/Paper
2006	143	282	22.94	1.97
2007	144	291	23.67	2.02
2008	131	234	19.03	1.78
2009	113	220	17.90	1.94
2010	126	202	16.43	1.60
Total	**657**	**1229**	**100**	**1.87**

Table- 7
Ranking of most prolific authors of the "Indian Journal of Pure and Applied Physics"

Sl. No.	Authors	Records	% of 657	Rank
1	Kumar R	21	3.196	1
2	Kumar A	20	3.044	2
3	Sonkawade RG	18	2.74	3
4	Gunasekaran S	16	2.435	4
5	Saxena NS	14	2.131	5
6	Kumar S	13	1.979	6
7	Prasad R	12	1.826	7
8	Sanyal SP	11	1.674	8
9	3 Authors	10(each)	1.522	9
10	3 Authors	9(each)	1.37	10

Table-8
Indian Journal of Pure and Applied Physics, 2006–2010: papers published, page length of papers and mean page length

Year	Page Range				No. of Papers	Total pages for papers	Mean page length of papers
	1-5	6-10	11-15	16-20			
2006	86	55	2	-	143	784	5.48
2007	91	48	4	1	144	785	5.45
2008	81	47	3	-	131	685	5.22
2009	61	47	5	-	113	612	5.41
2010	75	49	2	-	126	665	5.27
Total	**394**	**246**	**16**	**1**	**657**	**3531**	**5.37**
%	**59.96**	**37.44**	**2.43**	**0.15**	**100**	-	-

Number of paper published and their references

Table-9
Number of papers and references

Year	No. of Papers	No of References	Average No of references per paper	% age
2006	143	2754	19.25	22.05
2007	144	2549	17.70	20.41
2008	131	2495	19.04	19.98
2009	113	2251	19.92	18.02
2010	126	2438	19.34	19.52
Total	**657**	**12487**	**19**	**100**

Table 9 display numbers of papers published during the year 2006-2010 and their references. Table 9 revealed that the number of references have been increasing from 2006 to 2009 except the year 2010, where number of references decreased. The average no. of references per paper was minimum (17.70) in the year 2007 where as it was maximum (19.92) in the year 2009.Overall, the average number of references per paper during the period 2006 to 2010 was 19.

Conclusion

"Indian Journal of Pure and Applied Physics" has published 657 papers during the period 2006-2010. Maximum numbers of contributions are in the year 2007(21.918%). Out of 657 papers 614 papers (93.46%) are contributed by joint authors. Highest number of papers was contributed by CSIR with 54 papers (8.219%) in its share. Overall, the average citation per paper was 1.87. In authors ranking list Kumar, R ranks at 1st position with 21 publications. The overall mean page length of all the paper was 5.37. From the data collected for the present study, it may be seen that the Foreign contribution in Indian journal is significantly less. This shows that there is an urgent need to attract and put efforts by library and information professionals, researchers and library scientists of foreign country to make significant contribution to Indian journals. It is quite evident that technological infrastructure and research funds are basic prerequisites to overcome this problem.

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