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Original Research Article

Scientometrics study of Indian journal of pure and applied physics

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ABSTRACT

This paper presents Scientometrics study of The Indian Journal of Pure and Applied Physics during the period of 2010 to 2019. Researcher has to examined 853 articles been published during the period of study. The paper examined year wise distribution of articles, subjectwise distribution of articles, in Authorship pattern 2783 author was dected, The maximum number of contributions published 2012, 12th Issue, 50th Volume ; 149. The highest number of contributions published at single authors with 824; 39.60%, Two authors with 763; 27.41and the remaining 21 authors contributions with 657; 23.60%. The authorship pattern of the published in out of 2783 the maximum number of 824; (39.60%) had been contributed by single authors. 6. Out of 263 contributions are published in the journal of special issues. There are 117 contributions are published in the journal with 13.71%, and the remaining 35 contributions are published in the journal with 4.10%. Subject facet highest no of articles published i ,e. 251 papers have published in Electronic Structure, Magnetic and Optical properties. During the span of study have been analyzed.

1. Introduction

Scientometrics is a part of the sociology of science and has application to science-policy making. It involves quantitative studies of scientific activities, including among others, publication and so overlaps bibliometrics to some extent. Scientometrics is branch of the ‘Science of Science’, Nalimov and Mulchenko define this term, “as a sub field which applies quantitative methods to the study of science as an information process.” In this information and promoters of communication. Haitan treats ‘Scientometrics,’ as a scientific discipline which performs reproducible quantitative regularities, further he adds that scientometric methods include statistical and thesasurus methods, and indicators as to the number of citations, terms etc. (Amudhavalli, 1997). These are two aspects within science of science, viz.

1. The analytical aspect which deals with the general laws of the development of science as a knowledge system and a specific social institution, and
2. The normative aspect which deals with the the development of practical recommendation for raising research efficiency.

The aim of ‘Scientomterics’ is to determine the state and prospect of subject and its further development. Several Scientometric indicators are used for this prupose, and one of the most significant indicators is the number of publications; its change over time is usually considered as a measure of research topicality in a given field. These indicators are on the way to become a standard tools of evaluation and analysis in research management of science policy making. Considerable attention has been paid in recent years to way to measure scientific information, which may be used for the control of science development in two ways; practical and strategic. The practical way includes search of information to users. As far as the strategic

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use of information is concerned it implies the monitoring of science development and the analysis of the changing structure of science. [1]

Scientometrics is the quantitative study of science. It aims to analyze and evaluate science, technology, and innovation. Major research includes measuring the impact of authors, publications, journals, institutes, and countries as referenced to sets of scientific publications such asarticles and patents. It also aims to understand the behavior of scientific citations as a mean of scholarly communication and map intellectual landscapes of a science. Other effort focuses on the production of indicators for use in the evaluation of performance and productivity. [2] In practice, there is a significant overlap between scientometrics and other neighboring domains such as bibliometrics, informetrics, webometrics, and cybermetrics. Bibliometrics, one of the canonical research domains in library and information science, studies quantitative aspects of written publications. Informetrics is the study of quantitative aspects of information [3], regarded as an umbrella domain overarching the rest of them. Björneborn and Ingwersen [4] describe the relationships between these domains as abstracted in Figure 1.Driven by a variety of research communities, the volume of published literature in these domains has exponentially grown. Given the increasing publications and the scientific diversity in disciplines, a systematic investigation of the intellectual structure is in need to identify not only emerging trends and new developments but also historic areas of innovation and current challenges. The motivation of the present chapter lies in our intention to identify the intellectual structure of scientometrics in a systematic manner. Toward that end, we explore epistemological characteristics, thematic patterns, and emerging trends of the field, using scientometrics approaches. In particular, we operationalize scientometrics as encompassing closely related domains such as informetrics, bibliometrics, cybermetrics, and webometrics. In the rest of this manuscript, we use the term "scientometrics" inclusively. The present chapter aims to trace the evolution and applications of scientific knowledge in scientometrics. Thus, we also operationalize emerging trends and recent developments uncovered throughout the present chapter as "emerging technologies" in scientometrics. The contributions of the present chapter include followings. First, it helps the scientometrics community to be more self-explanatory as it has a detailed publication-based profile. Secondly, researchers in the field can benefit from this systematic domain analysis by identifying emerging technologies, better positioning their research, and expanding research territories. Finally, it guides those interested in the field to learn about historic footprint and current issues. The rest of the chapter is organized as follows. We introduce the methodology of the study. Then, the intellectual landscapes of scientometrics is described. We conclude this chapter with discussion into findings, implications, and limitations. [1,5–24]

R.A. Merton & Eugene Garfield, "Scientometics as the field of enquiry give over to the quantitative analysis of science and scientific fields."

Solla Price, "Scientormetric has followed the trajectory of econometric in use of quantitiative data, concepts and methods and expensive use of mathematical and statistical techniques of modeling and data analysis."

2. Review of Literature

This article reviews a few studies conducts various scientist on Bibliometrics study

Abdullah and Kaur (2002) explore the Malysain Journal of Library and Information Science for period of 1996 to2000.in his study he found average number of reference per articles 22.5 and length was 41.2 pages. Barkari and Willet (2008) covering the period 2001 to 2006 they found that number of publication was increase statically and significance changes in types of paper. Tiew (2000) found the 53% of articles contained journal self citations. Bhattacharya and Verma (2006) analysed growth pattern core journal and authors in the field of bibliometrics using data of LISA. Dhaman (2000) has done 10 years of Bibliometrics study in Ethenobotonay journal he found that institution wise, country wise, Authorship pattern, Reference cited and length of articles. Thankskodi (2010) examined data of social scientist on social science subject. He analyzed authorship pattern, subject wise distribution of article, average no of reference per article, cited article in year wise.

2.1. Indicators of productivity

Some of the very early work, from the 1920s onwards, concerned productivity in terms of the number of papers produced by an author or research unit; the number of papers journals produce on a particular subject; and the number of key words that texts produce. They all point to a similar phenomenon – the Paretian one that a small proportion of producers are responsible for a hhig proportion of outputs. This also means that the statistical distributions associated with these phenomena are generally highly skewed. [3]

Lotka (1926) studied the frequency distribution of numbers of publications, concluding that "the number of authors making n contributions is about 1/nn of those making one" from which can be derived de Solla Price's (1963) "square root law" that "half the scientific papers are contributed by the top square root of the total number of scientific authors". Lotka's Law generates the following ddistribution $P(X=k) = (6/\pi 2).k\ -2$ where k = 1, 2, . . .

Glänzel and Schubert (1985) showed that a special case of the Waring distribution satisfies the square root law.

Bradford (1934) hypothesised that if one ranks journals in terms of number of articles they publish on a particular subject, then there will be a core that publish the most. If you then group the rest into zones such that each zone has about the same number of articles, then the number of journals in each zone follows this law:

Nn = knN0 where k = Bradford coefficient, N0 = number in core zone, Nn = journals in the n th zone; Thus the number of journals needed to publish the same number of articles grows with a power law.[4]

Zipf (1936) studied the frequency of words in a text and postulated that the rank of the frequency of a word and the actual frequency, when multiplied together, are a constant. That is, the number of occurrences is inversely related to the rank of the frequency. In a simple case, the most frequent word will occur twice as often as the second most frequent, and three times as often as the third. rf(r) = Cr is the rank, f(r) is the frequency of that rank, C is a constant f(r) = C 1/rMore generally:

N is the number of items, s is a pparamete The Zipf distribution has been found to apply in many other contexts such as the size of city by population. All three of these behaviours ultimately rest on the same cumulative advantage mechanisms mentioned above and, indeed, all three can be shown to be mathematically equivalent (Egghe, Leo, 2005).

However, empirical data on the distribution of publications by, for example, a particular author shows that the Lotka distribution by itself is too simplistic as it does not take into account productivity varying over time (including periods of inactivity) or subject. One approach is to model the process as a cumulation of distributions (Sichel, 1985). For example, we could assume that the number of papers per year followed a Poisson distribution with parameter λ, but that the parameter itself varied with a particular distribution depending on age, activity, discipline. If we assume that the parameter follows a Gamma distribution, then this mixture results in a negative-binomial which has been found to have a good empirical fit (Mingers, J. & Burrell, 2006).[25–30]

3. Objective

The study will be carried with the following objectives –

1. To verify the authorship pattern
2. To find out the scientific productivity of journals
3. To find out the growth in literature
4. To find out dominant subject facet
5. To find out the quantitative output

4. Scope

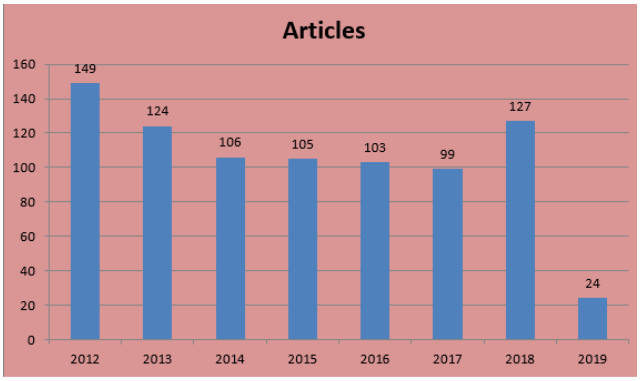
The scope of present study is limited to the issues published during 2012 to 2018 of the, Journal of Indian Journal of Pure & Applied Physics".

5. Materials and Methods

The data for the present study will be collected from the citing articles of published in Scientometrics Study of Journal of Indian Journal of Pure & Applied Physics during the scope of the study. All the gathered bibliographical details will stored in excel. The tabulated data will be analyzed to derive the results given under to objectives the result will be presented through the different tables and graphs.

Table 1: Year wise articles published

Sr No.	Year	Articles
1	2012	149
2	2013	124
3	2014	106
4	2015	105
5	2016	103
6	2017	99
7	2018	127
8	2019	24
	Total	853



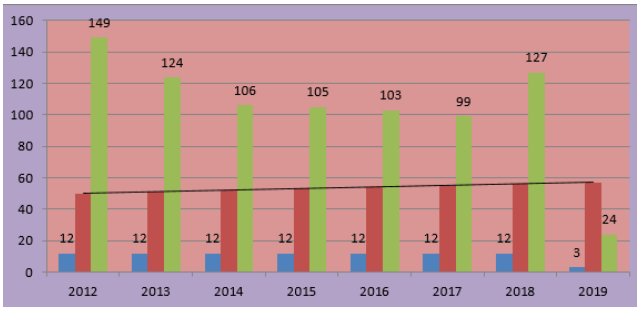
Graph 1: Year wise articles published

Table 1 shows the distribution of articles in "Indian Journal of Pure and Applied Physics" by the year 2012-2019. The journal published 853 articles during the period 2012-2019.The highest number of articles were published in the year 2012 contributing 149 articles followed by127 articles in the year 2018, 124 articles in 2013 and 106 articles in 2014.105 articles in 2015, 103 articles in 2016, and 99 articles in 2017.The minimum (24 articles) numbers of articles were published in the year 2019.

Table 2 show that 853 articles published during the year 2012 - 2019. The highest articles contributed t articles in the year of 2012 to 50th volumes and 12 Issues followed by 149 articles. The articles contributed in the year 2013 to 51th volume and 12lssues followed by124 articles. In the yaer 2014 to 52th volume and 12 Issues followed by 106 articles. 105 articles to 53th volume and 12 Issues in the

Table 2: Year & issue wise articles published

Sr No.	Year	Issue	Vol.	Articles
1	2012	12	50	149
2	2013	12	51	124
3	2014	12	52	106
4	2015	12	53	105
5	2016	12	54	103
6	2017	12	55	99
7	2018	12	56	127
8	2019	3	57	24
			Total	853



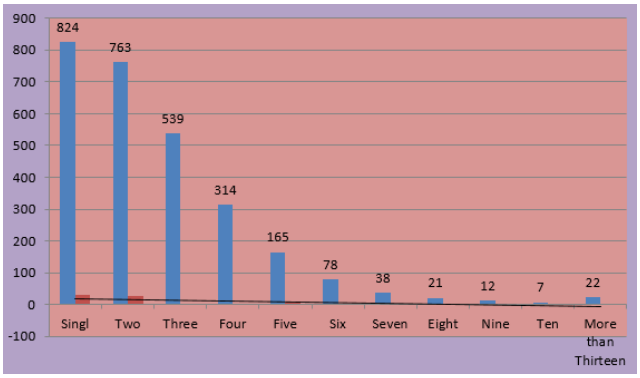
Graph 2: Year & issue wise articles published

year 2015. 103 articles to 54th volume and 12 Issues in the year 2016. 99 articles to 55th volume and 12 Issues in the year 2017. 127 articles to 56th volume and 12 Issues in the year 2018.The minimum 24 articles to 57th volume and 3 Issues published in the year 2019.

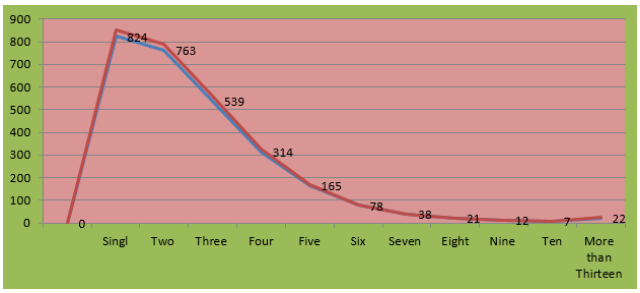
Table 3: Authorship pattern

No. of Authors	No. of Contributions	Parcentage (%)
Single	824	29.60
Two	763	27.41
Three	539	19. 36
Four	314	11. 28
Five	165	5.92
Six	78	2. 80
Seven	38	1. 36
Eight	21	0. 75
Nine	12	0. 43
Ten	7	0. 25
More than Thirteen	22	0.79
Total	2783	100

The authorship pattern of distribution shown the Table 3 Singl author and highest no of articles contributed their new ideas physics at 824 ; 29.60%. Two authors are 763 ; 27.41%. Three authors are 539 ; 19.36%. Four authors are 314 ; 11.28%. Five authors are 165 ; 5.92%. Six authors are 78 ; 2.80%. Seven authors are 38 ; 1.36%. Eight authors are 21 ; 0.75%. Nine authors are 12 ; 0.43%. Ten authors are 7 ; 0.25%. More than Thirteen authors are 22 ; 0.79%.



Graph 3: Authorship pattern



Graph 4: Authorship pattern in published by the year (2012 - 2019)

Table 4 shows the authorship pattern of the published during the period of study. Out of 2783 the maximum number of 824, (22,931.92%) had been contributed by Single authors. This is followed by Two authors with 763, (21, 234.29%), Three authors with 539 (15,000.37%), Four authors with 314 (8,738.62%), Five authors with 165, (4,591.95%), Six authors with 78, (2,170.74%), seven authors with 38, (1,057.54%), eight authors with 21, (584.43%), Nine authors with 12 (333.96%).Ten authors with 7, (194.81%), More than authors 22 (0.79%), Contributed by 23 authors during the year 2012-2019.

The Table 5 shows that out of 2783 papers single author contributed 824 papers (29.60%) while the rest 1959 papers (70.14%) were contributed by joint authors.

Table 6 show that the distribution of Contribution (Subject wise) during the year by 2012 - 2019. The Nuclear Physics of distribution are 38 (4.61%). Atomic and Molecular Physics are 109 (13.22%). Electromagnetism, Optics, Acoustic, Heat Transfer, Classical Mechanics and Fluid Dynamics are 131(15.89%). Condensed Matter: Electronic Structure, Electrical, Magnetic and optical properties are 251 (30.46%). Condensed Matter: Structural, Mechanical and Thermal Properties are 221 (26.82%). Physics of Gases, Plasmas and Electric Discharges are 13 (1.57%). Interdisciplinary Physics and Related Areas of

Table 4: Authorship pattern in published by the year (2012 - 2019)

No. of Authors	Year								No.Of Contributions	Parcentage (%)
	2012	2013	2014	2015	2016	2017	2018	2019		
Singl	145	122	105	106	102	104	126	14	824	29.60
Two	136	113	103	91	92	91	122	15	763	27.41
Three	94	85	69	74	51	65	89	12	539	19.36
Four	57	51	42	44	31	29	51	8	314	11.28
Five	37	27	19	21	18	13	28	2	165	5.92
Six	21	9	7	7	13	7	13	1	78	2.80
Seven	9	7	3	5	6	3	4	1	38	1.36
Eight	5	4	2	2	4	1	2	1	21	0.75
Nine	5	2	2		1	1	1		12	0.43
Ten	4	1	1				1		7	0.25
More than Thirteen	22								22	0.79
Total	534	421	353	350	318	314	438	54	2783	100

Table 5: Authorship Pattern in published papers by the year (2012 - 2019)

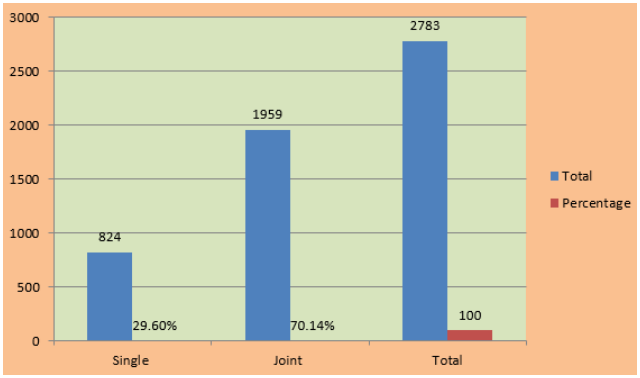
Authorship Pattern	Year								Total	Percentage
	2012	2013	2014	2015	2016	2017	2018	2019		
Single	145	122	105	106	102	104	126	14	824	29.60%
Joint	389	300	248	244	216	210	312	40	1959	70.14%
Total	534	422	353	350	318	314	438	54	2783	100

Table 6: Distribution of contributions (Subject Wise)

Subject	No. Of Contributions								Total	Parentage (%)
	2012	2013	2014	2015	2016	2017	2018	2019		
Nuclear Physics	11	7	4	1	8	3	3	1	38	4.61%
Atomic and Molecular Physics	30	19	12	12	13	8	12	3	109	13.22%
Electromagnetis, Optics, Acoustic, Heat Transfer, Classical Mechanics and Fluid Dynamics	13	21	13	12	25	18	25	4	131	15.89%
Condensed Matter: Electronic Structure, Electrical, Magnetic and optical properties	29	39	32	29	29	38	46	9	251	30.46%
Condensed Matter: Structural, Mechanical and Thermal Properties	29	24	20	27	20	29	37	6	221	26.82%
Physics of Gases, Plasmas and Electric Discharges	2	3	4	2	1	-	1	-	13	1.57%
Interdisciplinary Physics and Related Areas of Science and Technology	16	7	14	15	5	3	3	1	64	7.76%
General	-	3	3	4	1	-	-	-	11	1.33%
The Physics of Elementary Particles and Fields	-	-	3	2	1	-	-	-	6	0.72%
Review Articles	-	1	1	1	-	-	-	-	3	0.36%

Table 7: Special issue published during 2012 – 2019

Year	Special Issue	Vol. No.	Issue No.	No. o f Contributions
2012	Emerging Trends in Accelerator Radiation Safety — Part I	50	07	27
	Emerging Trends in Accelerator Radiation Safety — Part II	50	011	32
2013	Recent Advances in Solid State Ionics	51	05	21
2014	-	-	-	-
2015	-	-	-	-
2016	-	-	-	-
2017	-	-	-	-
2018	Dielectric Relaxation and Spectroscopic Techniques	56	04	17
	Advances in Radiation Physics	56	08	20
2019				
No. of Special Issues Contribution		117 (13.71%)		
No. of Issues Contribution		35 (4.10%)		
Total No. of Contribution		263 (30.83%)		



Graph 5: Authorship pattern in published papers by the year (2012 - 2019)

Science and Technology are 64 (7.76%). General are 11 (1.33%). The Physics of Elementary Particles and Fields are 6 (0.72%). Review Articles are 3 (0.36%).

The above Table 7 shows that the conferences conducted the July & November month that the year of 2012, May month that the year of 2013 and the April & August month that the year of 2018; there is no special issue in the year of 2014, 2015, 2016, 2017, 2019.

6. Conclusion

During the study researcher has indentified 8 Vol. Issue contributed various authors in the field of Indian journal of pure and applied physics. During the study total 853 articles have been identified that are published in 8 Issue this contribution is done by 2783 authors. It is also observed that Indian journal of pure and applied physics online and printed journals available 8 Issue. During 2012 TO 2019. It is observed that. Out of 853 articles. were single authored and its percentage in 29.60% it means contributers were least interested to share thie views & published it commenly. During the study it is found that in 8 Issue total 853 articles has been published this contribution done by 2012 articles 149 & authors 534, 2013 coutribution is article 124 and authors 422, 2014 contribution articles 106 and authors 353. 2015 articles 105 & authors 350, 2016 articles 103 & authors 318, 2017 articles 99 & authors 314, 2018 articles 127 & authors 438, and 2019 articles 24 & authors 54. There for it is cleared that authors are interested to contribute there view or ideas individualy.

6.1. The analysis revealed the following conclusions.

1. "Indian journal of pure and applied physics" has published 853 articles during the period 2012 - 2019. Maximum number of contributions are in the year 2012 (17.97%).
2. The maximum number of contributions published 2012, 12th Issue, 50th Volume; 149.
3. The highest number of contributions published at single authors with 824; 39.60%, Two authors with 763; 27.41and the remaining 21 authors contributions with 657; 23.60%.
4. The authorship pattern of the published in out of 2783 the maximum number of 824; (39.60%) had been contributed by single authors.
5. The highest number contributions are the subject wise 3; 251(30.46%).
6. Out of 263 contributions are published in the journal of special issues. There are 117 contributions are published in the journal with 13.71%, and the remaining 35 contributions are published in the journal with 4.10%.

7. The authorship pattern in published papers of contributions in single authors with 824; 29.60%, and joint authors with 1959; 70.14%

To conclude, let's have the overlook of the study undertaken by the researcher. Scientometrics Study of Journal of India journal of Pure and Applied Physics 2012 - 2019 has been selected as the study. Keeping a mind the time the researcher had for the completion of his work, the scope has been limited the issues of Indian Journal of Pure and Applied Physics published between 2012 - 2019.

Indian Journal of pure and applied Physics has been selected for the purpose of scientometrics analysis owing to its popularity and contribution considering Indian background. Indian Journal of Pure and Applied Physics has served as an intellectual impetus to the library profession working in India. It has been satisfying the intellectual need of the researcher of the students across the world.

The Scientometrics approach to the reference of each article has been gathered by using MS-Excl sheet. For this the fields like author, title, name of the journal act, are created. The collected data is analyzed to derive the reasons. While preparing the ranked list of the journals w ww.niscair.res.in. is consulted. Although the results are not very comprehensive, yet they are able to show some light on the Scientometrics patterns of the library profession. The researcher admits that there are limitations for the generalization of results. However, it is excellent piece of work the result of which need to be strengthened by more Scientometrics studies.[31,32]

7. Source of Funding

None.

8. Conflict of Interest

None.

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