Publications Trends in the Journal 'Photoacoustics': A Bibliometric Approach

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Abstract *- 'Photoacoustics' is a premier open access quarterly journal in the field of Optoacoustics published by Elsevier. It has started its publication on 2013. Till date only 82 articles, specially dedicated to the field Optoacoustics, are being published. The present study aims to discover the extent and reach of the journal in the field of Optoacoustics by considering different parameters like year-wise categorisation of articles, authorship pattern, reference pattern, length of the articles, subject-wise distribution articles published, etc. Throughout the study the quality of articles published in the journal is seen. Out of 82 articles, 70(85%) are research articles which shows the dedication of the journal mainly to the research in the field of Optoacoustics. Year-wise distribution of articles shows the regularity in publication with an average of 16 articles per year. The authorship pattern shows the tendency of multi authorship instead of single authorship. Most of the articles are having more than 4 authors per article with an average of 4.82 authors per article. USA contributed the most number (45.12%) of articles followed by Germany (14.63%) and Netherlands (07.32%) and the most sought area of research is Optoacoustic Imaging (46.34%) followed by Photoacoustic Tomography (24.39%) and Photoacoustic Microscopy (12.20%).*

Keywords: Bibliometric analysis, Publication trends, Journal productivity, Photoacoustics, Optoacoustics.

Introduction

In his article 'Statistical Bibliography or Bibliometrics', Alan Pritchard[1] (1969), for the first time coined the word 'Bibliometrics'. The term 'Biblio' means book and the term 'Metrics' means measurement or scale. So 'Bibliometrics' means measurement related to books. Pritchard defined bibliometrics as 'the applied form of statistics and mathematics to books and other media of communication'. As the time passed, bibliometrics acquired its own changes and finds different forms such as Scientometrics, Webometrics, Altmetrics, etc. Bibliometrics is a branch of study which finds application mainly in the subject field of Library and Information Science but not limited to that, finds application in much more day to day analytics. Bibliometrics or its derivatives can be used to study the qualitative and quantitative measurements of literatures published on a particular topic or in particular journal. This study aims to point out the publication trends in the journal 'Photoacoustics' in bibliometric view.

The journal 'Photoacoustics' is an open access peer reviewed quarterly online journal dedicated specially to the subject 'Optoacoustics', published by Elsevier since 2013. 'Optoacoustics' or 'Photoacoustics' being a narrow subject, the number of contributions to the journal is very limited. Since the first issue, only 82 articles have been published in the journal till date. All these articles were individually studied and analysed to find out results

based on different parameters like year-wise categorisation, authorship pattern, geographical distribution, reference pattern, Subject-wise distribution, etc. The study is helpful in understanding the vastness and reach of the fast growing subject field Optoacoustics.

Review of Literature

Manoj[2] (2018) in his study on contributions to the journal 'Annals of Library and Information Studies' from 2013 to 2016, was able to show the extent of coverage of journal in the subject field Library and Information Science. He used bibliometric analysis to show that the frequency of publication is consistent and most of the authors are from India. Also it is clear that the articles published in ALIS are jointly authored. Pandita[3] (2013) studied the contributions to the journal of 'Annals of Library and Information Studies' from 2002 to 2012 and concluded that co-authorship is prevailing in the articles than that of single authorship. He also elucidates various parameter wise distributions of articles published in ALIS in that period.

Kaminer and Braunstein[4] (1998) studied the impact of use of internet on scholarly productivity. They analysed the log files of UNIX operating system and concluded that the use of internet and its technology can make a drastic change in the quality of scholarly productivity. Zeleznik, Vosner and Kokol[5] (2017) conducted a study to examine the publication characteristics and development of Journal of Advanced Nursing during the period from 1976 to 2015 whereas bibliometric analysis of Tsunami research was done by Chiu and Ho [6] (2007).

Vergidis, Karavasiou, Paraschakis, Bliziotis and Falagas [7] (2005) studied the global trends for research productivity in Microbiology. For the study, they have analysed 89,527 articles and concluded that USA ranks first in the research productivity in Microbiology globally. A bibliometric study on Indian Journal of Chemistry done by Thanuskodi[8] (2011) shows that most of the contributions to journal were made by Indian Author in which majority of them are jointly authored. Korean Journal of Parasitology was bibliometrically analysed by Lee[9] (2009) with the help of SCI, PubMed, Scopus and Synapse database and concluded that more than 60% of the articles in Korean Journal of Parasitology were cited at least once by the articles in the above mentioned databases.

Authorship pattern of Library and Information Science Research in India from 1967 to 2004 in Library and Information Science Abstracts (LISA) were analysed by Patra and Chand[10] (2006). They applied Lotka's Law to study the authorship characteristics whereas the year-wise distribution, authorship pattern, citation pattern, length of articles, geographical distribution of authors, etc. of articles published in Indian Journal of Fibre and Textile Research for the period 1996 - 2004 were studied by Jena[11] (2006).

Objectives

The main objectives of the study are:

- To categorise the articles into research and non-research
- To find out the year-wise distribution of articles
- To find out the authorship pattern and geographical distribution of authors
- To find out the reference pattern, keyword distribution and length of the articles
- To find out the Subject-wise distribution of articles

Methodology

A conventional type of bibliometric analysis is used in the present study. Each article published in the journal 'Photoacoustics' is studied individually to extract the data. Microsoft Excel 2013 is used to tabulate and analyse the recorded data. Figures and tables were created for corresponding values wherever is necessary.

Analysis

The articles published in the journal 'Photoacoustics' from 2013 to 2017 were taken for the study. As Photoacoustics is a new and narrow subject field, only 82 articles were published till date. These articles were studied based on different parameters such as year wise distribution, authorship pattern, geographical distribution of authors, reference pattern, keyword distribution, average length of the articles, subject-wise distribution of articles, etc.

Categorisation of articles

The articles can be categorised mainly into two; research and non research. Out of 82 articles, 70 (85%) are research articles and only 12 (15%) are non research articles. Non research articles include Short Communications, Editorials, Review articles, etc. Figure 1 shows the pictorial representation of categorisation of articles.

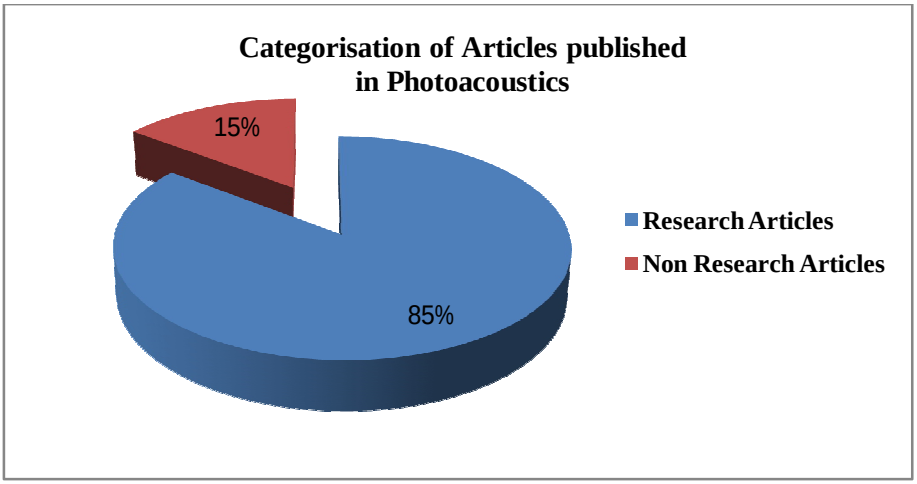

Figure 1 : Categorisation of articles published in Photoacoustics

Year-wise distribution of articles

The year-wise distribution of articles shows that on an average 16 articles were published in the journal 'Photoacoustics' yearly. Most of the articles (27%) were published in the year 2017 and least number of articles (12%) was published in the year 2013. The year-wise distribution of articles is given in the table 1.

Table 1 : Year-wise distribution of articles

Year	Issue	No of Articles	Total	Percentage
2013	1	1	10	1.22%
	2	5		6.10%
	3	2		2.44%
	4	2		2.44%

2014	1	6	16	7.32%
	2	5		6.10%
	3	4		4.88%
	4	1		1.22%
2015	1	6	19	7.32%
	2	5		6.10%
	3	4		4.88%
	4	4		4.88%
2016	1	4	15	4.88%
	2	4		4.88%
	3	5		6.10%
	4	2		2.44%
2017	1	4	22	4.88%
	2	5		6.10%
	3	6		7.32%
	4	7		8.54%
Total		**82**	**82**	**100.00%**

Authorship pattern of articles

From the study it is clear that almost all the articles published in Photoacoustics are multi-authored. 80(97.56%) out of 82 articles were published by joint authors and only 2(2.44%) were authored by single author. More than 6 authors contribute to the majority of articles. Out of 82 articles, 26(31.71%) were published by more than 5 authors and the average number of authors per article is found to be 4.82. This shows a trend towards multi-authored publication rather than, single authorship. Table 2 shows the authorship pattern of the articles published in 'Photoacoustics'.

Table 2 : Authorship pattern of articles

Authorship Type	**No of Articles**	**No of Authors**	**Percentage**	**No of Authors per Article**
Single Author	2	2	2.44%	1
2 Authors	12	24	14.63%	2
3 Authors	14	42	17.08%	3
4 Authors	15	60	18.29%	4
5 Authors	13	65	15.85%	5
More than 5 Authors	26	202	31.71%	7.77
Total	**82**	**395**	**100.00%**	**4.82**

Geographical distribution of authors

Geographical distribution of authors shows that most of the authors who contributed to the journal 'Photoacoustics' are from USA. 188(47.59%) authors out of 395 are from USA followed by Germany having 59(14.63%) and Netherlands having 22(07.32%). The Geographical distribution of authors are shown in the table 3.

Table 3 : Geographical distribution of Authors					
Country name	**No of articles**	**No of authors**	**Percentage of Articles**	**Percentage of Authors**	**No of authors per article**
USA	37	188	45.12%	47.59%	5.08
Germany	12	59	14.63%	14.94%	4.92
Netherlands	6	22	7.32%	5.57%	3.67
Canada	5	16	6.10%	4.05%	3.2
Russia	4	19	4.88%	4.81%	4.75
France	3	13	3.66%	3.29%	4.33
UK	2	14	2.44%	3.54%	7
Singapore	2	20	2.44%	5.06%	10
Austria	2	9	2.44%	2.28%	4.5
China	2	5	2.44%	1.27%	2.5
Switzerland	2	8	2.44%	2.03%	4
India	1	6	1.22%	1.52%	6
Italy	1	4	1.22%	1.01%	4
Japan	1	2	1.22%	0.51%	2
Korea	1	5	1.22%	1.27%	5
Taiwan	1	5	1.22%	1.27%	5
Total	**82**	**395**	**100.00%**	**100.00%**	**4.82**

Reference distribution pattern of articles

The reference distribution pattern shows that most of the articles have references between 21 and 40. There are no articles without references and 4(04.88%) articles are having more than 100 references. 10(12.20%) articles are having references less than 20. 37(45.12%) articles are having references between 21 and 40 whereas 23(28.05%) articles have references between 41 and 60. Only 8(09.76%) articles are there which have references between 61 and 100. The reference pattern of articles is shown in the figure 4.

Table 4 : Reference distribution pattern of articles

Sl No	**No of Articles**	**Percentage**
Zero	0	0.00%
1 to 20	10	12.20%
21 to 40	37	45.12%
41 to 60	23	28.05%
61 to 80	5	6.10%
81 to 100	3	3.66%
Above 100	4	4.88%
Total	**82**	**100%**

The average reference per article is 43.2 with 2016 having more (56.13) references per article. The year 2015 shows the least no (39.26) of references per article. Table 5 shows the average distribution of references per article.

Table 5 : Reference distribution pattern of articles

Year	No of articles	Total No of References	Averages reference per article
2013	10	396	39.6
2014	16	654	40.88
2015	19	746	39.26
2016	15	842	56.13
2017	22	904	41.09
Total	**82**	**3542**	**43.2**

Length of the articles

The average length of the articles is found to be 8.67 pages. The shortest article has 2 pages and the longest article has 15 pages. The average pages per article is shown in the table 6.

Table 6 : Length of the articles

Year	No of articles	Total No of Pages	Averages pages per article
2013	10	71	7.1
2014	16	140	8.75
2015	19	156	8.21
2016	15	139	9.27
2017	22	205	9.32
Total	**82**	**711**	**8.67**

Keyword distribution pattern in articles

The average keyword per article is found to be 4.73. 7(08.54%) out of 82 articles are having no keywords. The maximum number of keywords found in an article is 9. Table 7 shows the average number of keywords per article.

Table 7 : Keyword dsitribution pattern in articles

Year	No of articles	Total No of Keywords	Averages Keywords per article
2013	10	49	4.9
2014	16	80	5
2015	19	90	4.74
2016	15	64	4.27
2017	22	105	4.77
Total	**82**	**388**	**4.73**

Subject-wise distribution articles

Photoacoustics being a subject journal, the articles published in it are confined mainly to the subject area Optoacoustics. Still by analysing, the main theme of the articles can again categorise into different topics. Optoacoustic Imaging (46.34%) is the most sought area of research followed by Photoacoustic Tomography (24.39%) and Photoacoustic Microscopy

(12.20%). Rest of the subject area had been covered by less than 18% of the articles. The subject-wise distribution of articles is shown in the table 8.

Table 8 : Subject-wise distribution of articles

Subject Area	Year					No of Articles	Percentage
	2013	2014	2015	2016	2017		
Optoacoustic Imaging	3	7	11	4	13	38	46.34%
Photoacoustic Tomography	2	4	2	6	6	20	24.39%
Photoacoustic Microscopy	1	2	3	4	0	10	12.20%
Fiber Optics	1	1	0	1	1	4	4.88%
Optoacoustic Spectroscopy	2	1	0	0	0	3	3.66%
Thermoacoustics	0	0	1	0	1	2	2.44%
Photoacoustic Angiography	0	0	0	0	1	1	1.22%
Biomedical Photoacoustics	1	0	0	0	0	1	1.22%
Optical Scatteing	0	0	1	0	0	1	1.22%
Photoacoustic Impedence	0	0	1	0	0	1	1.22%
Photacoustic Sensing	0	1	0	0	0	1	1.22%
Total	**10**	**16**	**19**	**15**	**22**	**82**	**100.00%**

Conclusion

Elsevier journals generally have a good reputation in the field of Science and Technology. 'Photoacoustics', being one of those reputed journals, was able to create its own space among other journals dedicated to Optics, Acoustics and Physics. Out of 82 articles published in the journal till date, 70 are research articles. This shows the attempt to produce more research publications rather than publications of review or general theme. From the study it is clear that USA contributed most of the papers. The authorship pattern shows the nature of joint authorship rather than single. This is also a sign of research papers being published after good combined research in the field of Optoacoustics. High average no of reference per article also shows the extent of review that the authors made for a particular study. Being a narrow subject almost all the papers are strictly confined to the filed Optoacoustics or Photoacoustics and Optoacoustic Imaging is the most sought area of research. In total the journal 'Photoacoustics' can be considered as a premier publication in the field of Optoacoustics.

References

1. Pritchard, A. "Statistical Bibliography or Bibliometrics." *Journal of Documentation*, vol. 25, 1969, pp. 348-349.
2. Manoj, M. "Bibliometric analysis of contributions to the journal Annals of Library and Information Studies (ALIS) from 2013 to 2016." *International Journal of Information Movement* vol. 2, no. 9, 2018 pp. 63-68.

3. Pandita, R. "Annals of Library and Information Studies (alis) Journal: a Bibliometric Study (2002-2012)." *Desidoc Journal of Library and Information Technology*. Vo. 33, no. 6, 2013, pp. 493-497.
4. Kaminer, N., & Braunstein, Y. M. "Bibliometric analysis of the impact of internet use on scholarly productivity." *Journal of the American Society for Information Science,* vol. 49, no. 8, 1998, pp.720-730
5. Zeleznik, D., Blazun, V. H., & Kokol, P. "A bibliometric analysis of the Journal of Advanced Nursing. 1976–2015." *Journal of advanced nursing*, 2017
6. Chiu, W.-T., & Ho, Y.-S. "Bibliometric analysis of tsunami research." *Scientometrics : an International Journal for All Quantitative Aspects of the Science of Science, Communication in Science and Science Policy*, vol.73. no.1, 2007, pp. 3-17
7. Vergidis, P. I., Karavasiou, A. I., Paraschakis, K., Bliziotis, I. A., & Falagas, M. E. "Bibliometric analysis of global trends for research productivity in microbiology." *European Journal of Clinical Microbiology & Infectious Diseases,* vol. 24, no. 5, 2005, pp. 342-346
8. Thanuskodi, S. "Bibliometric Analysis of the Indian Journal of Chemistry." *University of Nebraska: Lincoln Libraries,* 2011
9. Lee, Choon Shil. "Bibliometric Analysis of the Korean Journal of Parasitology: Measured from SCI, PubMed, Scopus, and Synapse Databases." *The Korean Society for Parasitology* (2009)
10. Patra, S. K., & Chand, P. "Library and information science research in India: A bibliometric study." *Annals of Library and Information Studies,* vol. 53, no. 4, 2006 pp. 219-223.
11. Jena, K. L. "A bibliometric analysis of the journal 'Indian Journal of Fibre and Textile Research, 1996-2004'." *Annals of Library and Information Studies,* vol. 53, no.1, 2006, pp. 22-30.