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Marine Pollution Bulletin: A Scientometric Analysis

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Abstract

This study aims to present a scientometric analysis of the Marine Pollution Bulletin journal (MPB) during the period of 2008 to 2017. A total of 5416 publications were published during the period of 2008 to 2017 in the MPB journal. The paper covers the scientometric analysis of year-wise distribution of publications. Out of total 5416; the maximum numbers of publications are in the year 2017 contributing 905 (16.71%) papers. The relative growth rate (RGR) has decreased from 2009 (0.63) to 2017 (0.18) and the doubling time has increased from 2009 (1.10) to 2017 (3.85) in the span of 10 years. The degree of collaboration in the MPB journal is 0.94, which clearly indicates its dominance of multiple authors' contributions. Among the Prolific authors, Liu J. is in the top rank who has contributed 49 articles. In geographical distribution of publications the highest number of contribution from United States 910 (12.06%).

Keywords: Scientometrics, Authorship Pattern, Degree of collaboration, Relative Growth Rate, Doubling time, Information Sources, Geographical Distribution.

Introduction

The United Nations Convention on the Law of the Sea defined pollution as 'the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of the sea water and reduction of amenities'. This article aimed to present the growth of the research and current trends in the marine pollution literature. This study reveals that how the research in Marine pollution is going on worldwide. This study also helps the book selection committee to decide whether to add more books or not in this discipline.

Marine Pollution Bulletin is published by Elsevier since 1970. The Journal is related with the rational use of marine resources in the seas, oceans and the tidal mouth of a large river, as well as with documenting marine pollution and introducing new forms of measurement and analysis. The Journal covers the topics related to marine pollution as news, comment, reviews

and research reports. Moreover it covers the topics concerned with sewage disposal and pollution control, and also on the management, economic aspects and protection of the marine environment. Marine Pollution Bulletin (ISSN 0025-326X) published monthly and 2016 impact factor is 3.146.

Review of Literature

Teli, S., and Maity, A (2015) have analyzed the growth pattern of Higgs Boson literature during 2005-2014. The Scopus database has used to retrieve relevant data. Identified 4359 records contributed worldwide. The distribution of publications based on the year of production, country wise productivity, document type of the publications, Major subject categories , authors whose contribution is in the maximum level were studied. In India, the research in this field is infantile stage. The lacking on the contribution may be due to non- availability of international collaboration.

Thanuskodi (2011) analyses of articles and references provided at the end of each article contributed in *Indian Journal of Chemistry* from 2005-2009. The analysis cover mainly the number of articles, authorship pattern, forms of document cited, etc. All the studies point towards the merit and weakness of the journal which will be helpful for its further development. This study showed that most of the contributions are India. The authorship pattern of the articles published during the period of study. Maximum number of articles were contributed by two authors. This study also showed that majority of the contributors preferred journals as the source of information which occupied the top position. All the studies point towards the merits and weakness of the journal which will be helpful for its further development.

Sangam, S. L., and Bagalkoti, V. T. (2015) have analyzed the study of academic rankings of the National Assessment and Accreditation Council (NAAC) accredited 50 Indian Universities output of publications in India extracted from Scopus database. This study explores that, 108666 papers during the study period 2001-2010. The average output is 2173 papers, in comparison the largest Number of papers 6533 (6.01%) was published by Jadavapur University, followed by Banaras Hindu University 6249 (5.75%). A total 336027 citations received, with an average citation per paper as 3.09. Utkal University scored highest average (9.23). According to collaboration, Anna University (7.22%) stands in the top place. This study provides the reader with a comprehensive understanding of a university, ranking schemes based on its methodological issues, and impacts on society. The rankings are used in policy and academic discussions.

Tripathi, H.K., Sharma, J., and Garg, K.C. (2015) have focused analyzes publication output of India on cereal crops reflected by its coverage in Indian Science Abstracts (ISA) and CAB Abstracts during 1965-2010. This paper indicates that highest number of papers (43.80%) published on rice, followed by wheat (24.28%). The highest numbers of papers published in Indian Journal of Agricultural Science. Indian Agricultural Research Institute, New Delhi, Tamil Nadu Agricultural University, Coimbatore and Punjab Agricultural University, Ludhiana contributed about 7% of papers each. The major research was focused on 'genetic and plant breeding' (28.2%) followed by 'agronomic aspects' (27.9%). The authorship pattern reveals that Co-authored papers accounted for 90% of total output. The findings of the study will be beneficial for the scholars and scientists who are engaged in research of various disciplines of

crop science as well as policy makers in the field of agricultural sciences.

Prasanna Kumari, N., Amsaveni, N., and Surulinathi, M. (2015) have examined the global level perspective of Occupational Therapy research output during the period of 1989 to 2015, and the data extracted from the Web of Science database. 8095 publications were retrieved. This study explores, the highest number of records has found to be at 2013. Author's productivity dominates and there is a need of promoting single author productivity in this field. It found that in the year 2007, 386 records have published with highest Global Citation Score of 6525. University of Queensland tops first in the ranking followed by the University of Toronto with high Global Citation Scores. In the country wise, distribution of publications the United States of America stood in first rank position and India holds the 25th position in the global ranking. India has to improve in the field of Occupational Therapy in future.

Thanuskodi (2010), analyses of articles and references in Library Philosophy and Practice from 2005 to 2009. The analysis covers the number of articles, authorship patterns, subject distribution of articles, average number of references per article, forms of documents cited, year-wise distribution of cited journals, rank list of journals, etc. Strong and weak points are discussed, as the basis for improvement and development.

Rajneesh and Rana, M. S. (2015) have examined research output of Computer Science Literature, articles published in the Source "Journal of the ACM", for 10 years in between 1999 and 2008. The study stated that a total number of 336 papers comprise of 10799 citations. The highest average citations per article were 37.25 the overall average of the citations per article is 32.14. Journals and conference proceedings and both of them together have shared 77% of the total citations. 3926 (36.88%) citations authored by a single author, whereas 6719 citations (63.12%) were multiple authors. It is evident that Computer science is one of the emerging disciplines.

Karpagam, R. (2014) has evaluated the nanobiotechnology literature, from extracted from SCOPUS database for the period 2003-2012. A total of 114684 papers published during 10 years, which received 2,503,795 citations with an average of 21.83 citations per paper. It has been observed that during 2003-2012, USA held the first position by a number of publications (34,736), h-index (349), g-index (541), hg-index (434.52) and p-index (326.47). Developing countries such as India, China, South Korea and Canada showed increasing trends in their publications and their activity index showed increasing trends. Top 10 institutions contributed 7.16% share of total publications. Massachusetts Institute of Technology, USA received the highest h-index (120) among the top 10 institutions. Biomaterials (1631), the top journal of publication output; Nano Letters had the highest impact with an average citation per paper (73.86) and American Chemical Society received the highest h-index (158) among the top 10 journals.

Manoharan, A. et al. (2014) have analyzed the research literature output on Fibromyalgia; the data were downloaded from Pub med database. About 4607 articles are taken for validating the law of scattering, 80/20 rule, and author productivity is measured by Kumaravel's prepotency Index that is supported by Dr. Ranganathan's canon of prepotency. Among 943 journals that have produced 4957 research papers, 188 (20%) journals have produced 3794 papers which are nearly 80 percent of

the total output and 1272 articles (27.61%) were contributed by single authors. 2950 articles (51%) of a total number of articles were contributed by the authorship pattern of two to five authors. The important finding is that, in spite of the fact that research collaboration is the trend of the day, more than one-fourth of publications in fibromyalgia research are the results of solo research or research in peril.

Thanuskodi (2010) discussed the research output performance of social scientists on social science subjects. The analysis cover mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc.

Yeoh and Kaur (2008) analyses the publication output of Research in Higher Education for subject support in collection development in the light of growing interest in diversified domains of research in higher education. Consequently, analysis of 40 issues of publications revealed a diversified usage pattern of bibliographic reference sources by contributing researchers, with a cumulative total of citations being 8,374. A positive trend in research collaboration of contributing authors, and a steady growth in the use of reference sources, periodicals and web documents in the citations signify the trend of scholarly communication of research works in the electronic age. Similar to other disciplines of research findings, journals and books were the most cited source materials for researchers thrash out.

Objective of Study

- To determine the year wise distribution of articles
- To calculate the relative growth rate and doubling time
- To find out the authorship pattern and prolific authors
- To calculate the degree of collaboration
- To find out type of articles published
- To study the geographical distribution of contributions

Scope and methodology of the study

The present study is limited to the field of Marine Pollution. The data was collected from SCOPUS databases which covers the Marine Pollution Bulletin journal from 2008 to 2017 and used MS Excel to organize, tabulate and analyze the data for the study.

Data Analysis and Interpretation

In this paper, an attempt has been made by the investigator to analyze the data collected for the study to achieve the desired objectives. Various statistical techniques are used for the analysis tabular representation and diagrammatic representations are used to make the analysis more meaningful.

Year wise distribution of articles

During the period from 2008 to 2017, 5416 articles were published. Table 1 show that the

numbers differs from year to year. Out of total 5416 articles, the maximum numbers of articles are in the year 2017 contributing 905 articles, which are 16.71% to the total publications. The minimum numbers of articles are in the year 2009 with 303 articles, which are 5.59% to the total publications.

Table 1: Year wise distribution of publications

Year	No. of Publications	Percentage	Cumulative Growth	Cumulative %
2008	349	6.44	349	6.44
2009	303	5.59	652	12.04
2010	335	6.19	987	18.22
2011	441	8.14	1428	26.37
2012	409	7.55	1837	33.92
2013	520	9.60	2357	43.52
2014	673	12.43	3030	55.95
2015	694	12.81	3724	68.76
2016	787	14.53	4511	83.29
2017	905	16.71	5416	100.00
Total	5416	100.00		

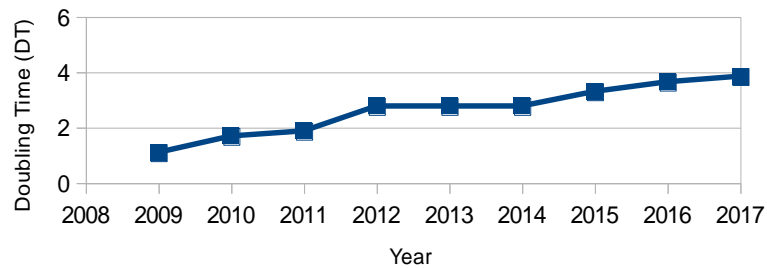
Relative Growth Rate and Doubling Time – Year Wise

Table 2 shows that the Relative Growth Rate (RGR) has decreased from 2009 (0.63) to 2017 (0.18) in the span of 10 years. The Doubling Time (DT) has increased when calculated year-wise. The Doubling Time increases from 1.10 in 2009 to 3.85 in 2017.

Table 2: Relative Growth Rate and Doubling Time

Relative Growth Rate and Doubling Time by Year Wise						
Year	No. of Publications	Cumulative	W1	W2	$R(a) = \frac{W_2 - W_1}{T_2 - T_1}$	Dt. = $\frac{0.693}{R(a)}$
2008	349	349		5.85		
2009	303	652	5.85	6.48	0.63	1.10
2010	335	987	6.48	6.89	0.41	1.69
2011	441	1428	6.89	7.26	0.37	1.87
2012	409	1837	7.26	7.51	0.25	2.77
2013	520	2357	7.51	7.76	0.25	2.77
2014	673	3030	7.76	8.01	0.25	2.77
2015	694	3724	8.01	8.22	0.21	3.30
2016	787	4511	8.22	8.41	0.19	3.65
2017	905	5416	8.41	8.59	0.18	3.85
Total	5416					

Doubling Time



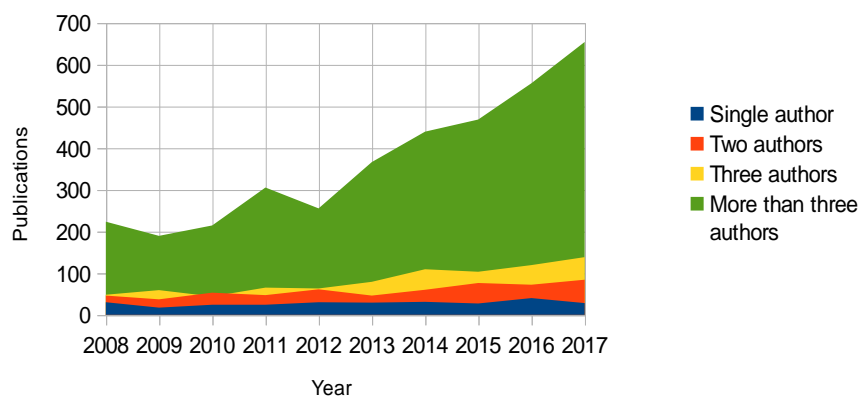
Authorship pattern

Table 3 shows that the single authorship pattern has the least productive publications i.e. 280 (5.17%) papers. The multiple authorship patterns are further analyzed to shed more light on the pattern of collaboration. Publication with two authors are 582 (10.75%) papers followed by three authorship pattern with 827 (15.27%) papers and more than three authorship pattern have 3668 (67.73%) papers followed by Anonymous author are 59 (1.09) papers. The average number of authors per paper is 4.88 i.e. 26431 authors written 5416 papers.

Table 3: Authorship Pattern

Year	Single author	Two authors	Three authors	More than three authors	Anonymous	Total
2008	30	46	48	223	2	349
2009	17	37	59	189	1	303
2010	24	53	44	214	0	335
2011	24	47	65	305	0	441
2012	30	61	63	255	0	409
2013	29	46	79	366	0	520
2014	31	60	109	439	34	673
2015	27	76	103	468	20	694
2016	40	72	119	555	1	787
2017	28	84	138	654	1	905
Total	280	582	827	3668	59	5416
% of Publications	5.17	10.75	15.27	67.73	1.09	100
Total Authors	280	1164	2481	22506	0	26431

Authorship Pattern - Year Wise



Degree of Collaboration

Table 4: Degree of Collaboration

Authorship Pattern	No. of Publications	Percentage%
Single Author	280	5.17
Multiple Author	5136	94.83
Total	5416	100

Degree of collaboration in the Marine Pollution Bulletin Journal

To determine degree of collaboration in quantitative terms, the formula given by K. Subramanyam (1983) was used.

The formula is

Where C = Degree of collaboration

NM = Number of multi authored papers

NS = Number of single authored papers

$$C = \frac{NM}{$$

$$\frac{NM + NS}{$$

$$C = \frac{5136}{$$

$$\frac{5136 + 280}{$$

In present study the value C is 0.94

As a result, the degree of collaboration in the Marine Pollution Bulletin journal is 0.94, which clearly indicates its dominance of multiple authors' contributions

Prolific Authors

Table 5 shows that there are a total of 15705 authors have contributed 5416 articles. Liu J. has contributed forty nine articles; Zhang J. and Zhang Y have contributed forty five articles, whereas Shin P.K.S. author have contributed forty two articles published in the Marine Pollution Bulletin during 2008 to 2017.

Table 5: Top Ten Prolific Authors

Authors	Contributions	Percentage	Rank
Liu, J.	49	0.18	1
Zhang, J.	45	0.17	2
Zhang, Y.	45	0.17	2
Shin, P.K.S.	42	0.15	3
Li, Y	38	0.14	4
Wang, Y.	38	0.14	4
Wang, J.	37	0.13	5
Li, X.	36	0.13	6
Morton, B.	33	0.12	7
Elliott, M.	32	0.12	8



Distribution of papers by their types

Table 6 shows that out of 5416 Papers published in the Marine Pollution Bulletin Journal, highest number of contribution was from Article 4963 (91.64%), followed by Editorial 126 (2.33%), Article in Press 118 (2.18%), Review is 80 (1.48%), Note is 51 (0.94%), Letter is 50 (0.92%), Erratum is 25 (0.46%) and Conference Paper 3 (0.06%).

Table 6: Types of Papers

Type of Papers	No. of Papers	Percentage
Article	4963	91.64
Editorial	126	2.33
Article in Press	118	2.18
Review	80	1.48
Note	51	0.94
Letter	50	0.92
Erratum	25	0.46

Conference Paper	3	0.06
Total	5416	100.00

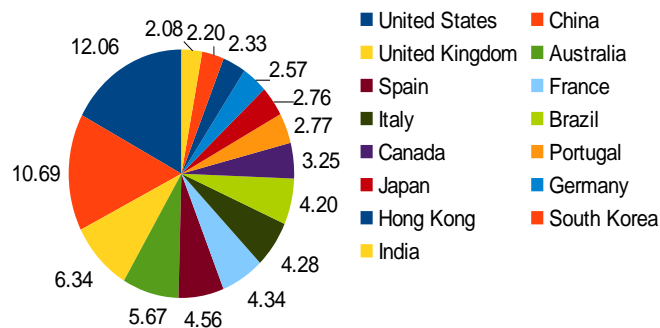
Geographical Distribution

Table 7 shows that the geographical distribution of contributions of the journal under study. Out of 7543 contributions, the highest number of contribution was from United States 910 (12.06%) followed by China 806 (10.69%), United Kingdom 478 (6.34%), Australia 428 (5.67%) and India 157 (2.08%). Among the top fifteen countries contributed articles, India has been placed fifteen.

Table 7: Geographical distribution of publications

Country	Total	Percentage
United States	910	12.06
China	806	10.69
United Kingdom	478	6.34
Australia	428	5.67
Spain	344	4.56
France	327	4.34
Italy	323	4.28
Brazil	317	4.20
Canada	245	3.25
Portugal	209	2.77
Japan	208	2.76
Germany	194	2.57
Hong Kong	176	2.33
South Korea	166	2.20
India	157	2.08

Geographical Distribution



Conclusions

The publishing trend totally depends on the output of contributors, patterns of contributions and the quality of research. The year 2017 shows the maximum number of contributions to the Marine Pollution Bulletin journal. This study reveals that the categories of article distributions are remarkable in this research journal. The majority of the articles were contributed by multiple authors. It is registered that Liu J. has most proliferate author who have contributed forty nine articles. Marine Pollution Bulletin journal is notably a scholarly journal that stipulates or induces fruitful research for the marine pollution.

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