A BIBILIOMETRIC ANALYISIS OF LITERATURE ON MARINE SCIENCE RESEARCH

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Abstract

This study has focused on matrics in Library Science, the application of Mathematical and Statistical methods for interpretations of the Tables. Three laws are used here for table analysis. Totally they are put at 1157 output over a period of six years from 2001- 2006. The output appeared with Conference /Seminars proceedings rank as second in order in an overall output. The Books as the source of output comes fourth in order of the total marine science output. The Bulletin constitute in overall Marine Science research output. It records the fifth place in the overall publications of Marine Science Literature.

Marine Science literature during period from 2001 to 2006. The total publications of research output was 1157 under four categories of institutions. It could be seen clearly from the above that out of various institutions university comes first in order of the total Marine Science output. Colleges come second in order of the total Marine Science research output. Research institutions come third in order of the total research output and Autonomous organizations come last in order of the total research output.

Keywords: Bibliometrics, Lotka law, Marine Science, institutions, literature

Introduction

Recent years have seen a rapidly growing interest in the use of quantitative parameters for assessing the quality of research carries out in Research Institutions & Universities. This has been stimulated especially by the increasing restrictions on the funding available to support scientific research and escalation in the cost of publications. Pritchard coined the term 'Bibliometrics' which, he defined as a branch of information theory that attempts to analyze quantitative analysis implied the application of mathematical models and techniques to all aspects of written communications. Librarians began to use quantitative techniques in their day today administration. Especially to evaluate libraries and their services. The present study attempts to evaluate the Marine Science research output through Bibliometric analysis. It is a known fact that there are studies to evaluate the performance of subject, but there is no concrete and systematic study in evaluating Marine Science research. Hence, there is a gap of research in this area. In order to fill this gap the present study is undertaken.

History of Bibliometrics

The history of bibliometrics can be divided into there convenient periods. The first period relates to the earlier studies, most of discussed the quantity of literature produced over the years. They second period witnessed the publication of works by Lotka, Bradford

and Zipf who discovered the phenomenon of scattering in literature. The third is the modern period which begins with the publications of Garfields, Pritchard and price. A brief discussion of each work is furnished under the heading: Literature of Bibliometrics.

Literature on Bibliometrics

A simple and straightforward counting of publications was the beginning the Bibliometrics. The objective then was to study the history of a subject and it quantitative development over the years. Now other aspects of literature such as growth, scattering, decay and time perspective, and the bibliographic variables of documents such as author, subject and reference are also subject to Bibliometric analysis. Here the objective is shifted to make an assessment of the literature and all activities connected with research.

Starting from the earliest study by Coles and Eales in 1917 to he works of Eugene Garfield, about 2000 items are identified as in 1980. To review even 2% of this ever growing, literature is beyond the purview of this researcher. However, those that are seminal and directly related to the study are discussed below.

Scattering of Journal Literature

The problem of growth is complicated by the scattered nature of literature. Literature growth is directly related to the scattering of articles on a given subject in great many journals. Citation studies also revealed that in any given subject, a substantial portion of the references is found concentrated in a relatively small number of journals and the rest scattered is a very large number of journals peripheral to the subject.

Bradford analyzed a four years bibliography of journal articles in applied geophysics. A Total of 1332 article were collected from 258 journals and listed the journals in the descending order or productivity of articles. The ranked list of journals was divided into three zones, each containing roughly the same number of articles. Bradford observed that the number of journals contributing articles to each zone increased by a multiple of about five. The first one contained a 9 journals giving out of 429 articles, the second contained 59 journals contributing 499 articles, and the third zone contained 258 journals presenting 404 articles. Bradford compared this phenomenon to the appearance of a comet which has a small and bright nucleus, a wider debris and long tail of gas molecule. Based on these observations Bradford wrote the number of periodicals in the nucleus and the succeeding zone will be 1:n:n…

The number of journals in each zone in his case study was roughly proportional to 1:5:25. An important use of the Bradfordian distribution is to check on the completeness of a bibliography. For any subject it is necessary to analyze the productivity of only the most productive periodicals as determined by the Bradford ranked list. This will help to estimate the comprehensiveness of a bibliography. A Bradford ranked list of journals is one that saves time and effort in estimating the required size of literature in any field and the cost

of covering the whole or any specified portion of it. An understanding of Bradfor's discovery of literature – Scattering is valuable to librarians when they are faced with the cost-benefits consideration in subscribing to journals.

Brookes studies the Bradfordan distribution in detail and recognized its similarity to another empirical law that bears the name of Zipf. In 1949, George K. Zipf published his book Human Behavior and the principle of Least Effort containing a wealth of date from a number of fields. Among other things he studies the frequency with which words occur in a given text. Zipf calculated the frequency of words in James Joyce's Ulysses. He arranged the 29,899 individual words used by Joyce in the descending order of their frequency of occurrence. The number of times each word occurs in the text is f. Each word was assigned a frequency rank r from 1 onwards. (i.e, the r for the most frequency occurring word is 1). The r range from 1 to the last frequency occurring last word ranked at 29, 899. Zipf found that by multiplying the numerical value of each rank r by its corresponding frequency f, h obtained a products c, which is constant throughout the text. Thus the Zipf's law is stated as rf = c.

Objectives

The researcher has framed the following objectives for the purpose of present research.
1. To identify the pattern of distribution of Marine science research output in Tamil Nadu State Level.
2. To identify the rate of growth of Marine Science Literature by calculating relative growth rates and doubling time for publication.
3. To test the applicability of Lotka's Law to the scientific productivity of authors.
4. To assess the institutional output in Marine Science research in Tamil Nadu.
5. To identify the geographical distribution of journals.
6. To prepare a ranking list of journals.

Hypotheses

The following hypotheses have been formulated with a view of the above-framed objectives.
1. Tamil Nadu marine sciences scientists preferred to publish their research articles more in Indian Journals.
2. The relative growth rate of Marine Science literature shows a declining trend and contrastingly doubling the time for publication reveals a increasing trend.
3. The implication of Lotka's law related with author productivity in Tamil Nadu Marine Science Literature.
4. There is a considerable level of inter – country and international journal variation of Tamil Nadu Marine Science scientist.

5. There is considerable level of variation in output in different Marine Science sub field.
6. The Marine science research conforms to the collaborative research trend.

Methodology

The present study is carried out about the published Marine science documents and their research output are analyzed in terms of their distribution, both at state, and national level particularly in Tamil Nadu pertaining to Marine Science scientists contribution. The study examines the growth rates of research output in terms of absolute level of growth and relative level of growth over a period to time. An attempt is made to analyze the institution wise growth rate. The author productivity is examined in identifying the pattern of research contribution among Marine Scientist. The study explores the research concentration in Marine Science and Journals of priority in publishing Marine Science articles.

Data Collection

The publication of Marine Science Scientists comprise the contributions to primary journals, proceedings or transaction of National or International Congress/ Colloguia/ Symposia, papers published in books, reports and other secondary sources. The publication of Marine science scientists in Tamil Nadu covered by Aquatic Science and Fisheries Abstract (ASFA) data base on CD/ROM (2001-2006) were taken as the predominant source of the present study.

Statistical Tools

In order to identity the relative growth rate, the researcher has adopted a model developed by Mahapatra. The relative growth rate is increase in the number of publications per unit of time. The mean relative growth rate R (1-2) over a specified period of interval can be calculated from the following equation.

$$R(1\text{-}2)= \frac{W_2 - W_1}{T_1 - T_2}$$

Where,

R (1-2)-Mean relative growth rate over the specified period
Interval;

$W1 = \log W_1$ (Natural log of initial number of publications)

$W2 = \log W_2$ (Natural log of initial number of publications)

$T_2 - T_1$ = The unit difference between the initial time and final time.

The relative growth rate of publications can be calculated separately. Therefore,

R (a) = Relative growth rate per unit publication per unit of time (Year)

Degree of Collaboration

It explains that the percentage of single authored papers is less than that of multi authored papers in Marine Science research.

Doubling Time for Publications

It denotes a number of publications of a subject Marine science research doubles during a given period of time.

Author productivity

Author productivity examines the prevailing trend in carrying out the research process in Marine Science in terms of the extent to which the research performance in concentrated by a single authors.

Authorship Pattern

It aims at analyzing the percentage of single and multiple authors contributed Marine Science research output.

Limitations

The study period covers only 6 years from 2011 – 2006 journals alone are given more weight age, in analyzing the growth, trend and performance in publishing research articles. It is due to lack of relevant information about other sources at a greater level. Due to late arrival of published sources in the year 2006, the researcher has only used limited data for the year 2006. The analysis is confined to Tamil Nadu Marine Science Scientist research output.

Table No: 1 Showing Source Wise Distribution of Output of Marine Science Literature

Forms of Publications	2001	2002	2003	2004	2005	2006	Total
Journal Articles	202	150	144	131	81	19	727
Conference/ Serminar Proceedings	173	170	25	7	5	5	385
Reports	3	5	10	3	5	-	26
Books	6	1	4	1	1	-	13
Bulletin	-	2	4	-	-	-	6
Total	**384**	**328**	**187**	**142**	**92**	**24**	**1157**

Source: ASFA

Totally they are put at 1157 output over a period of six years from 2001- 2006. The output appeared with Conference /Seminars proceedings rank as second in order in an overall output. The Books as the source of output comes fourth in order of the total marine

science output. The Bulletin constitute in overall Marine Science research output. It records the fifth place in the overall publications of Marine Science Literature.

Table No: 2 Showing Distribution of Marine Science Research Output of International, National, and State Level

Year	International Output	Indian Output	Tamilnadu Output
2001	39587	5830	384
2002	40326	4535	328
2003	38112	3519	187
2004	35543	2920	142
2005	34155	1157	92
2006	32326	515	24
Total	**220049**	**18746**	**1157**

Source: ASFA

Table No: 2 Indicates International, National and State level Marine Science research output explicit the following facts. In the year 2001 the published Marine Science research output was 39,587 at the international levels and it rose to 220049 by the end of the year 2006. Indian Marine Science research output was 5830 in 201 and it rose to 18476 by the end of 2006. Regarding, Tamil Nadu State level Marine Science research output was 384 in 2001 and it rose to 1157 by the end of year 2006.

Table No: 3 Showing Distribution of Research Output by All Institutions

S.NO	Institutions	2001	2002	2003	2004	2005	2006	%	Total
1	Universities	215	199	130	80	62	19	69.9	705
2	Colleges	68	77	50	53	26	5	24.11	279
3	Research Institutions	101	40	5	8	5	-	13.73	159
4	Autonomous Organisations	-	11	2	1	-	-	1.21	14
	Total	**384**	**328**	**187**	**142**	**92**	**24**	**100**	**1157**

Table No: 3 illustrates that the institutions wise research output of Marine Science literature during period from 2001 to 2006. The total publications of research output was 1157 under four categories of institutions. It could be seen clearly from the above that out of various institutions university comes first in order of the total Marine Science output. Colleges come second in order of the total Marine Science research output. Research

institutions come third in order of the total research output and Autonomous organizations come last in order of the total research out put.

Table No: 4 Showing Growth rates of Colleges

Years	No. of. Output	Cumulative No. of output	|W1	|W2	R(a)	Mean R(a) 1-2	Doubling Time Dt (a)	Mean Dt (a)1-2
2001	68	68		4.22				
2002	77	145	4.22	4.97	0.75		0.92	
2003	50	195	4.97	5.27	0.3		2.31	
2004	53	248	5.27	5.51	0.24	0.43	2.88	6.11 Years
2005	26	274	5.51	5.61	0.1		6.93	
2006	5	279	5.61	5.63	0.02	1.06	34.65	20.79 Years

Mean R (a) 0.28 9.54 Years

Table No: 4 indicates that the relative growth rates and doubling time for Marine Science research output by colleges. It is noted that the relative growth rates have decreased from 0.75 in 2002 to 0.02 in 2006. From their decline, an increased performance was high level during in the 2002. The mean relative growth rates for the periods of 2002-2004 and 2005-2006 are 0.43 and 0.06 respectively. In aggregate level it is 0.28

Findings and Conclusion

The findings of source wise distribution of Marine Science research output bring our the facts that of the various source of Marine Science literature publications, the articles that appeared in journal record to first order followed by conference proceedings, Reports, Books and bulletin in their respective order. In general, publications of articles in journals take the predominant representation. It is due to the prevalence of greater level of procolative and dissemination effects of journals throughout the world.

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