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**BIBLIOMETRICS:**

Library and information science (LIS) and related fields in the sociology of science and science and technology studies have developed a range of theories and methodologies— now including bibliometric, scientometric, webometrics—concerning quantitative aspects of how different types of information are generated, organized, disseminated and used by different users in different contexts. Historically, this development arose during the first half of the twentieth century from statistical studies of bibliographies and scientific journals. These early studies revealed bibliometric power laws like *Lotka's law* on productivity distribution among scientists (Lotka, 1926); *Bradford's law* on the scattering of literature on a particular topic over different journals (Bradford, 1934); and *Zipf's law* of word frequencies in texts (Zipf, 1949) (Björneborn and Ingwersen).

**Hood and Wilson** (HOOD & WILSON, 2001) clear the concept of in his article bibliometrics and scientometrics have been introduced simultaneously by Pritchard, Nalimov and Mulchenko in 1969. Pritchard<sup>1</sup> defined the term 'Bibliometrics' as 'the application of mathematical and statistical methods to books and other communication medium'. Although, famous Bradford's law (1934) of scattering, Lotka's law (1926) of scientific productivity are regarded as milestones in bibliometrics, but bibliometrics research actually started in late sixties. Later in the seventies and eighties, bibliometrics research took a distinct shape and emerged as a prominent discipline.

**Online Oxford Dictionaries** (Oxford, 2013) defined the term Bibliometric means, 'statistical analysis of books, articles, or other publications.'

**Catharina Rehn and Ulf Kronman** (Rehn & Kronman, 2008) cited Pritchard's definition of bibliometrics describes it as "the application of statistical and mathematical methods to books and other media of communication"

Term bibliometrics defined by **Mamoona Kousar And Khalid Mahmood** (Kousar & Mahmood) in his article The use of mathematical and statistical methods to study and identify patterns in the usage of materials and services within a library or to analyze the historical development of a specific body of literature, especially its authorship, publication and use. Prior to the mid-20<sup>th</sup> century, the quantitative study of bibliographic data and usage was known as statistical bibliography.

**Glanzel (GLÄNZEL, 2003)** gives brief history of bibliometric study in his book, The statistical analysis of scientific literature began almost 50 years before the term "bibliometrics" was coined. In 1926, *Alfred J. Lotka* published his pioneering study on the frequency distribution of scientific productivity determined from a decennial index (1907-1916) of *Chemical Abstracts*. Lotka concluded that "*the number (of authors) making n contributions is about 1/n<sup>2</sup> of those making one; and the proportion of all contributors, that makes a single contribution, is about 60 percent.*"

This result can be considered as a rule of thumb even today, 75 years after its publication. At almost the same time, in 1927, *Gross and Gross* published their citation-based study in order to aid the decision which chemistry periodicals should best purchased by small college libraries. In particular, they examined 3633 citations from the 1926 volume of the *Journal of the American Chemical Society*. This study is considered the first citation analysis, although it is not a citation analysis in the sense of present-day bibliometrics.

Eight years after Lotka's article appeared, *Bradford* (1934) published his study on the frequency distribution of papers over journals. He found that "*if scientific journals are arranged in order of decreasing productivity on a given subject, they may be divided into a nucleus of journals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus when the numbers of periodicals in the nucleus and the succeeding zones will be as 1: b : b<sup>2</sup> ...*"

*Zipf* (1949) formulated an interesting law in bibliometrics and quantitative linguistics that he derived from the study of word frequency in a text. According to Zipf  $rf = C$ , where  $r$  is the rank of a word,  $f$  is the frequency of occurrence of the word and  $C$  is a constant that depends on the text being analysed. It can be considered a generalisation of the laws by Lotka and Bradford. He formulated the following underlying principle of his law although he has never shown how this principle applies to his equation. "*The Principle of*

*Least Effort means... that a person...will strive to solve his problems in such a way as to minimize the total work that he must expend in solving both his immediate problems and his probable future problems..." (Zipf, 1949).*

Bibliometrics has obvious advantages. It is seemingly easy to carry out and provides factual elements of information when properly used. It has a considerable disadvantage in that it summarizes with numbers, in a potentially biased way, the scientific production of researchers without taking into account the multiple complexities involved in assessing the originality and quality of scientific work.

### REVIEW OF LITERATURE:

Bibliometric study is very important for the librarian's concern .Because it helps to librarian to subscribe the important and valuable journal in every subjects.

**Patra, Bhattachary and Neera** (Patra, Bhattacharya, & Neera, 2006) explained importance of bibliometric study in his article. Bibliometrics is also relevant for researchers, policy and decision makers and also researchers outside the library and information science (LIS) field to track the trend in the specific field in their research work. **Jena , Swan, and Sahoo** state (Jena, Swain, & Sahoo, 2012) the maximum no. of cited documents from journals. It is found that the *journal* citations are predominant (57.4%of the total citations) followed by *books* (16.5%) and *web resources* (11.6 %). **Thanuskodi** explained in his article (Thanuskodi, 2011) bibliometric analysis has many applications in the library and information science filed in identifying the research trends in the subject, core journals, etc. and thereby framing new subscription policy for tomorrow. **Dean Hendrix** (Hendrix, 2008) explained the importance of bibliometric study is very important on school, college, department, laboratory level with the future research.

**Madan s Rana and Sunita Agarwal** (RANA & AGARWAL, 1994) mentioned in his research article collaborative research increased in 1980-1989. **K. Dhiman** (Dhiman, 2000) concluded Indian contributions in ethnobotany research are higher than foreign contribution. **M. Doraswamy** (DORASWAMY, 2013) have analysed a study on information use pattern of library and information Science professionals: a bibliometric study of Conference proceedings. **Bidhan Ch. Biswas, Amit Roy and B.K.Sen** (Biswas, Roy, & Sen, 2007) analysed citations in their study *Economic Botany: A Bibliometric Study*. **Campbell, Picard-Aitken and Cote** (Campbell, Picard-Aitken, & Cote, 2009) present in their study the taxonomy used in determining the domains of activity of NCIC and NCI researchers, the bibliometric indicators used to quantify scientific outputs, and the statistical analysis performed on bibliometric indicators.

**Ming-Yueh Tsay** (Tsay, 2011) analysed citations in his study 'A Bibliometric Analysis on the Journal of Information Science'. In the study journal, book, e-resources, and conference proceedings appeared to be most cited document types. Journal contributes about 50% of the cited literature and book about 20%. **Evaristo Jimenez-Contreras, Mercedes De La Moneda and Elvira Ruiz de Osma** (Jiménez-Contreras, De La Moneda, & de Osma, 2006) mentioned in his article 'A Bibliometric Model for Journal Discarding Policy at Academic Libraries' the importance of bibliometric study in discarding policy for periodicals in libraries.

### OBJECTIVES OF THE STUDY:

The study of this journal has been undertaken with analyzing the following objectives:

- To analyze the chronological distribution of articles published in IJBT during 2003-2012
- To analyze the subject wise articles
- To analyze the pagination/length wise articles
- To find out the illustration used in the articles
- To discover the subject headings in the publishing papers.

### RESEARCH METHODOLOGY

Between these five metrics sciences bibliometrics, first came in existence in 1969. It is the statistical analysis method of publication pattern and the like. The other metric sciences – infometrics, scientometrics,

cybermetrics and webometrics, are also statistical methods and having their origin on the basis of bibliometrics.

Quantitative research methods along with metric techniques helps to derive the conclusions regarding content analysis and the usage pattern of various types of communication contents as like books, journals, web contents and like. Present research study has applied the metric technique for the content and citations analysis i.e. bibliometric.

#### SCOPE AND LIMITATION OF THE STUDY:

The National Institute of Science Communication and Information Resources (NISCAIR), New Delhi publishes 17 research journals in various fields. Researcher selected the data from Vol. No. 1 to Vol. No.11 (2003-2012) total 40 issues of Indian Journal of Biotechnology (IJBT) published by NISCAIR, New Delhi.

#### DATA ANALYSIS AND FINDINGS

The present study the following parameters were considered:

##### Year, Volume and Issue wise Published Research Articles

*Table 1 Year, Volume and Issue wise Published Research Articles*

Year	Vol. No.	Issue No.				No. of Research Articles
		1	2	3	4	
2002	1	12	12	12	14	50
2003	2	12	17	17	23	69
2004	3	23	20	22	23	88
2005	4	22	21	21	22	86
2006	5	21	22	27	20	90
2007	6	21	22	22	22	87
2008	7	21	21	21	22	85
2009	8	18	16	16	17	67
2010	9	16	16	16	16	64
2011	10	21	16	16	15	68
2012	11	17	19	21	20	77
2013	12	18	23	20	18	79
<b>No. of Research Articles</b>		<b>222</b>	<b>225</b>	<b>231</b>	<b>232</b>	<b>910</b>

Table 1 reveals that volume wise and issue wise publication of journals. Total 12 volume and 48 issues are considered for this study. Maximum 90 articles are published in 2006 and minimum 50 articles are published in the 2002.

#### SUBJECT WISE ANALYSIS OF ARTICLES

Main subject wise distributions of articles are published in the journal. There are total 9 main aspects of biotechnology found in the article's subjects. In this study, maximum articles are from Agriculture and Botany (415, 45.60%) subjects and minimum articles are from Bioinformatics (7, 0.77%). Under the Life Sciences following sub subjects are included i.e. Biology, Microbiology, Genetics, Molecular Biology, Bimolecular and Genomics.

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### TOP TEN SUBJECT HEADINGS IN ARTICLES

Top ten keywords appeared in the articles. Total 4158 keywords are found in the 910 articles. Out of that, maximum 57 times Random Amplified Polymorphic DNA (RAPD) word is coming. On second position Micro Propagation word is coming.

### Year wise and Types of sources wise Growth of Literature

There are three types of sections in the journal. All articles are published in three sections. These three columns sequence are: 1) Review, 2) Papers and 3) Short Communications published in the journal. In these three sections Review column is irregularly published in the journal. In Papers and Short communications columns research articles are regularly published in each and every issues and volume. The table also presents the Review articles 37, Papers 738 and short communications articles are 135. Total 910 articles are published during the study period.

### Pagination wise articles

Pagination wise of analysis of articles. Maximum 180 articles were 5 pages and minimum 1 article were 19, 23 and 25 pages in overall articles. Whereas, maximum 6 articles were 12 pages and minimum 1 article were 11, 18 and 19 pages found in the review articles. Maximum 175 articles 5 pages and minimum 1 article were 23 and 25 pages found in the papers articles. And maximum 78 articles were 3 pages and minimum 1 article were 11 pages found in the short communications articles.

### Illustrations wise articles (Tables)

Tables were used in the articles. 178 articles are not used tables in the research articles. Maximum 203 articles used 2 tables and minimum 1 article used 10, 11 and 12 tables each in the articles in overall articles. In review articles 14 articles were not used any tables. 127 articles in papers and 37 articles in short communications not used any types of tabulation support.

### Illustrations wise articles (Figures)

Researchers used supporting figures in the articles. Maximum 151 articles used 2 figures in the articles and 1 article used 30 and 36 figures in overall articles. Maximum 6 articles used 3 figures and minimum 1 article used 14 figures in the review articles. Maximum 118 papers articles used 2 figures and 1 article used 14, 30 and 36 figures. Maximum 33 articles used 1 figures and minimum 1 article used 9 figures in short communications. 15 (review), 79 (papers), 24 (short communications) and 119 (overall articles) were not used any figures in supporting to articles writings.

### CONCLUSION

Analysis of content analysis in the journal. It has covered the Publications, Subject Headings, Illustrations used in the articles, and growth of publications. Author productivity is frequency measured in terms of published output. Author productivity is synonymous with the terms scientific productivity, publication productivity and trends of publications. One of the most fundamental norms for an author or a researcher or a scientist is to promulgate their research findings amongst their papers. (Kulkarni, 2011)

### REFERENCES:

- Anyi, K., Zainab, A., & Anuar, N. (2009, April). Bibliometric studies on single journals: a review. *Malaysian Journal of Library & Information Science*, 14(1), 45-46.
- Biswas, B., Roy, A., & Sen, B. (2007, July). Economic Botany: A Bibliometric Study. *Malaysian Journal of Library & Information Science*, 12(1), 23.
- Björneborn, L., & Ingwersen, P. (2004). Toward a Basic Framework for Webometrics. *Journal Of The American Society For Information Science And Technology*, 55(14), 1216.

- Campbell, D., Picard-Aitken, M., & Cote, G. (2009, January 10). Bibliometrics as a Performance Measurement Tool for Research Evaluation: The Case of Research Funded by the National Cancer Institute of Canada. *American Journal of Evaluation*, 1(18).
- Dhiman, A. (2000, December). Ethnobotany Journal: A ten Year Bibliometric Study. *IASLIC Bulletin*, 45(4), 182.
- DORASWAMY, M. (2013). Use pattern of library and information Science professionals: a bibliometric study of Conference proceedings. *International Journal of Digital Library Services*, 3(1).
- Geisler, G. (2004). *Bibliometrics and Transaction Log Analysis*. LIS. Simmons College.
- GLÄNZEL, W. (2003). Bibliometrics As A Research Field: A course on theory and application of bibliometric indicators. In *Course Handouts*.
- Hendrix, D. (2008, October). An analysis of bibliometric indicators, National Institutes of Health funding, and faculty size at Association of American Medical Colleges medical schools, 1997–2007. *Journal of Medical Library Association*, 96(4).
- HOOD, W. W., & WILSON, C. S. (2001). The literature of bibliometrics, scientometrics,. *Scientometrics*, 52(2).
- Jena, K. L., Swain, D. K., & Sahoo, K. C. (2012). Annals of Library and Information Studies, 2002–2010: A Bibliometric Study. *Library Philosophy and Practice*.
- Jiménez-Contreras, E., De La Moneda, M., & de Osma, E. (2006). A Bibliometric Model for Journal Discarding Policy at Academic Libraries. *Journal Of The American Society For Information Science And Technology*, 57(2).
- Kousar, M., & Mahmood, K. (n.d.). *Dr. Syed Jalaludin Haider: a Bio-bibliometric Study*.
- Kulkarni, J. (2011). *Mapping CALIBER, NAELIN & IASLIC Proceedings: A Scientometric Study (Unpublished Doctoral Dissertation)*. Aurangabad: Dr. Babasaheb Ambedkar Marathwada University. Retrieved June 18, 2016, from <http://shodhganga.inflibnet.ac.in/handle/10603/84317?mode=full>
- NISCAIR. (2013, April). *ABOUT NISCAIR*. Retrieved April 06, 2013, from CSIR-NISCAIR: <http://www.niscair.res.in/home.asp>
- NISCAIR. (2013, 04 06). *Indian Journal Of Biotechnology*. Retrieved 04 06, 2013, from NISCAIR ONLINE PERIODICALS REPOSITORY (NOPR): <http://www.niscair.res.in>
- Oxford, U. (2013, 04 06). *Oxford Dictionaries*. Retrieved 04 06, 2013, from Oxford Dictionaries: <http://oxforddictionaries.com/definition/english/bibliometrics>
- Patra, S. K., Bhattacharya, P., & Neera, V. (2006, January). Bibliometric Study of Literature on Bibliometrics. *DESIDOC Bulletin of Information Technology*, 26(1).
- RANA, M., & AGARWAL, S. (1994, March). AUTHORSHIP TRENDS IN INDIAN WILDLIFE AND FISHERIES LITERATURE - A BIBLIOMETRIC STUDY. *Annals of Library Science and Documentation*, 41(1), 18.
- Rehn, C., & Kronman, U. (2008). *Bibliometric handbook for Karolinska Institutet*. Anno: Karolinska Institutet University Library .
- Thanuskodi, S. (2011). Bibliometric Analysis of the Indian Journal of Chemistry. *Library Philosophy and Practice*.
- Tsay, M.-Y. (2011, June). A Bibliometric Analysis on the Journal of Information Science. *Journal of Library and Information Science Research*, 5(2), 15.