

CHAPTER I

INTRODUCTION

Bibliometrics is a type of research method used in Library and Information Science. It is a quantitative study of various aspects of literature on a topic and is used to identify the pattern of publication, authorship and secondary journal coverage with the objective of getting an insight into the dynamics of growth of knowledge in the areas under consideration. This consequently leads to the better organization of Information resources, which is essential for its most effective and efficient use. Bibliometrics today has attained sophistication and complexity having national, international, and interdisciplinary character. The present study focuses attention on the bibliometric analysis of the pattern of publication, authorship, and journal coverage by Science Faculty members in the Universities of Tamil Nadu.

1.1 Origin of Bibliometrics

The term "Bibliometrics" was first coined by Pritchard in 1969, and its usage and practice can be traced back to the second

Decade of this century. A pioneer example of a bibliometric study was a 'statistical analysis of the literature' of comparative anatomy from 1543 to 1860 by counting the number of titles, both books and journal articles, and grouping them by countries of origin within periods.

In 1923 the second study was conducted by Hulme, entitled "Statistical Analysis of the history of Science". His analysis was based on the original entries in the seventeen sections of the "English International catalogue of Scientific Literature".

The third study was the pioneering work of Gross and Gross reported in 1927. They used the method of counting and analysing the citations appended to articles in the Journal of the American Chemical society, and produced a list of Journals of 'importance in chemical education'. The fourth and prominent work was of Bradford in 1934 on the distribution and in Lubrication research. This research found the backbone of the theoretical foundation of the 'Bibliometrics' study, known as the "Bradford's Law of Scattering."

Thereafter, a lot of studies were made in this field by various scientists. De Solla Price published some of the first observations of

exponential rate growth in a number of scientific Journals. More recently in 1971 Goffman developed the epidemic theory for the growth rate of specific scientific area of activity. Vickery, Clark, and others have also illustrated a recent application of this type of Analysis.

a. Analogous terms

Bibliometric is just one of many sciences whose name ends with "metrics". Many scientists used the term under different names, but the concepts were more or less supplementary and complementary to each other with some broader and narrower extension of human ideas. One name that was used quite early but very scarcely was statistical analysis of the literature by Cole and Eales in 1917, while Hulme used the term 'statistical Bibliography' in 1923.

In 1948, the great Indian Library Scientist, S.R.Ranganathan, coined the term "Librametry", which historically appeared first and perhaps seemed proper to streamline the services of librarianship. The term 'Bibliometrics' is just analogous to Ranganathan's 'Librametrics', the Russian concept of 'Scientometrics,' FID's 'Informetrics' and to some other well established sub-disciplines like

'Econometrics', 'Psychometrics', 'Sociometrics', 'Biometrics', 'Technometrics', 'Chemometrics', 'Cliometrics', where mathematical and statistical calculus have been systematically applied to study and solve problems in their respective fields. Now-a-days, the term 'Scientometrics' is used for the application of quantitative methods to the history of science and obviously overlaps with bibliometrics to a considerable extent.

b. Definitions of Bibliometrics

The word 'Bibliometrics' is coined by two words 'biblio' and 'metrics'. The word 'biblio' is derived from combination of a Latin and Greek word 'biblion' means book, paper. On the other hand the word 'metrics' indicates the science of metre i.e. measurement.

Merton and Garfield (1963) defined it as the "field of inquiry given over to the quantitative analysis of science and scientific field".

Pritchard (1969) defined it as "the application of mathematical and statistical methods to books and other media of communication". Fairthorne (1969) defined the term as, "the

Quantitative treatment of the properties of recorded discourse and behavior pertaining to it".

The British Standard Glossary of Documentation of Terms (1976) explained bibliometrics as, "the study of the use of documents and patterns of publication in which mathematical and statistical methods have been applied", which is basically similar to Pritchard's definition.

Hawkins (1977) interpreted bibliometrics as "quantitative analysis of the bibliographic features of a body of literature." Nicholas and Ritchie (1978) in their book entitled literature on bibliometrics stated that bibliometrics "provide information about the structure of knowledge and how it is communicated?"

Morales (1985) uses the term informetrics to cover almost all the aspects of bibliometrics and Libra metrics. According to Broadus (1987), "Bibliometrics is the quantitative study of physical published units or bibliographic units or of surrogates of either."

Sengupta (1920) viewed bibliometrics as "Organisation, classification, and quantitative evaluation of publication patterns of

all macro and micro communications along with their authorship by mathematical and statistical calculus."

1.2 Bibliometric Laws

Bibliometric Laws are statistical expressions which seek to describe the working of science by mathematical means. The three basic laws in bibliometrics are: Lotkaw's Inverse square law of 'Scientific Productivity'(1926);

1. Zipfs 'Law of Linguistics' (1933); and
2. Brad ford's 'Law of scattering'(1934).

a. Lotka's Law

Lotka's Law is considered as the earliest and most widely applied study in measuring the scientific productivity of an author. He claims that a large proportion of the literature is produced by a small number of authors and it is distributed so as the number of people producing 'n' papers is approximately proportional to $1/n^2$.

b. Zipfs Law

Zipfs Law is a statistical distribution of word frequency on a hyperbolic curve, which states: "If the words are arranged in their decreasing order of frequency, then the rank of any given word of

the text will be inversely proportional to the frequency of occurrence of the word.

c. Bradford's Law

Bradford's Law is perhaps the best known of all the bibliometric concepts. His law describes how the literature on a subject is distributed in journals. He divides the articles found on a subject into three roughly equal zones, which increase by a multiple of above five. The relation between number of periodicals coming in the first zone of the 'nucleus' and the successive zones could be represented as $1: n : n^2$...Apart from the verbal formula, Bradford also gives a graphical representation of scattering of articles in periodicals.

1.3 Applications of Bibliometrics

Bibliometrics as a technique has extensive applications in identifying the research trends in a subject, trends in authorship and collaboration in research, core periodicals, obsolescence and dispersion of scientific literature useful in estimating the comprehensiveness of secondary periodicals, studying the author productivity and impact of research, distribution of scientific publications by Universities, citation studies and so on. Most of these studies pertain to Universities, faculty members, disciplines

and documents. Further, bibliometrics could be used in the identification of emerging research areas.

The popularity in the adoption of bibliometric techniques in various disciplines stimulated stupendous growth of literature on bibliometrics and its related areas. The techniques are now being vigorously pursued, and with the result, it has been found that one fourth of all the articles published in a Library and Information Science periodicals also carry a large number of articles on bibliometrics. These techniques are being used for a variety of purposes like determination of various scientific indicators, evaluation of scientific output, selection of journals for libraries and even forecasting potential Nobel Laureates.

In the recent years, there has been an explosive growth in human knowledge. In fact, the nature and tempo of growth has been such as to far outstrip the achievements of the past centuries. As science itself grows in extension and intention and the number of scientists increases. So obviously does the volume of literature generated by the scientific community. The growth of literature itself has caused a fairly widespread alarm and the term that describes explosion also known as information explosion.

It could be noted that at the global level about 5 million articles are being published annually in about one lakh journals. The 5th edition of the world list of scientific periodicals shows a two hundred per cent increase in the number of scientific periodicals since 1970. De Solla Price claimed, that the science literature has grown exponentially in the last three centuries with a doubling rate of approximately 15 years.

The major focus of the study is to apply the bibliometric analysis with a view to analyse the performance of research output of faculty members in the Universities of Tamil Nadu. The study has resulted in a special attention on the performance of research output in science. It aims at examining the emergence of research areas, research groups and research department in Universities with a view to map the cognitive or intellectual structure of research.

1.4 Statement of the problem

The present study aims at analysing the research output performance of faculty members in the Universities of Tamil Nadu In the field of science. In academic and scientific work, publication is the chief means of communicating research, a primary means of recognition and reward, and hence a central social process in the

Universities. Therefore, it is through publication the scientists receive professional recognition and esteem as well as promotion, advancement, and funding for future research. Publication is so central to productivity in research that the work becomes 'a work' only when it takes a conventional, physical (that is published) form, which can be received, assessed and acknowledged by the scientific community. Hence publication is a social norm in a public sense and serves as a tool for the betterment of the individuals. After publication only, it can be called as research and can be fixed or judged and acknowledged by the scientists in the society.

It could be seen clearly from the above discussion that bibliometric analysis is an important tool in analyzing any discipline. By keeping this view in mind, the researcher intends to undertake the study on research productivity of Faculty Members in the Universities of Tamil Nadu: A bibliometric Analysis. This study attempts to analyse the performance of Faculty Members working in the Universities of Tamil Nadu in terms of growth rate, areas of research concentration, author productivity and authorship pattern.

REFERENCES

1. Cole, F.J. and Eales, N.B. "The History of Comparative Anatomy part 1.A statistical analysis of Literature science," Science Progress,**11** (1917): 578-596.
2. Hulme, E. W. Statistical Bibliography in relation to the growth of modern Civilization , London: Grafton. 1923.
3. Gross, P.L.K. and Gross, F.M. "College Libraries and Chemical Education," Science 66(1927):386-389.
4. Bradford, S.C. "Sources of Information on specific subjects," Engineering (1934) 137:85-86.
5. De Solla Price D.J. Little Science. Big Science. New York: Columbia University, 1934.
6. Goff man, William. "A Mathematical methods for analyzing the growth of a scientific discipline." Journal of the Association of Computer machine 18.2 (1971):173-185.
7. Vickery, B.C. "Statistics of scientific and technical articles." Journal of Documentation 24.3(1968): 192-196.
8. Clark, C. V. "Obsolescence of the patent literature." Journal of Documentation 32.1 (1976): 32-52.
9. RangaNathan, S.R. "Library and its scope." DRTC Annual seminar 7.2 (1969): 285- 301.

10. Merton, R.K. and Garfield, E. Foreword to little science. big science -and beyond by D J Solla Price. New York: Columbia University, 1963.
11. Pritchard, A. "Statistical bibliography: An interim bibliography." Journal of Documentation 24.4 (1969): 69.
12. Fairthorne, R.A. "Emprical hyperbolic distributions (Bradford Zip-mandelbort) for bibliometric description and prediction." Journal of Documentation 25.4 (1969): 313-343.
13. British Standard Institution. British Standards of Documentation Terms. London: BSI. 1976.
14. Hawkins, D.T. "Unconventional uses of On-line Information Retrieval systems: On-line Bibliometric studies." Journal of American Society of Information Sciences 28.1 (1977): 13-18.
15. Nicholas, D., and Ritchie, M. "Literature on Bibliometrics". London: Bingely. 1968.
16. Schrader, Alvin M. "Teaching Bibliometrics." Library Trends 30 (1981): 151-172.
17. Potter, W.G. "Introduction to Bibliometrics." Library Trends 30 (1981): 5-7.
18. Morales, M. "Information and its Importance." International Forum. for Information and Documentation 10 (1985): 15-21.

19. Broadus, R.N. "Definition of Bibliometrics." Scientometrics 12 (1987): 373-398.
20. Sengupta, I.N. "Bibliometrics and its application." Ed. Pushp: Dhyani. New Delhi: Atlantic, 1990.
21. Wyllus Ronald E. "Emprical and theoretical bases of Zipf Law." Library Trends 30 (1981):53-64.
22. Maheswarappa, B.S. 'Bibliometrics:-An overview" Library and Information Science: Parameters and Perspectives Ed Devarajan, G., New Delhi: Ess Ess, (1977).