Chapter - II

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

This chapter devotes to analyze the past trends in research output in bibliometric studies. It enables one to identify the area of research concentration in any subject.

This analysis helps to explore the content and meaning of research output over the years. Generally research on bibliometric study has been carried out in different various disciplines by different researchers. In this context, it is essential to trace the extent to which those research implications could be relevant to the present study. The ongoing discussion can highlight the same.

Alfred J. Lotka developed a theoretical modal to explain author productivity. It is an inverse square law relating to author productivity. It explains that number of authors making the contribution is above 1/n2 of those making a single contribution and proportion of the contribution that makes a single contribution is about 60 percent. [1]

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1) Alfred J. Lotka, Frequency distribution of scientific productivity,. journal of Washington academy of science, Vol.-16, 1926. pp. 317 - 323

Bradford law is one of the useful tools in bibliometric analysis. It explains that a group of journals are arranged in an order of decreasing productivity, that is the journals that yield the most relevant articles coming first and the most unproductive the last. Then the journals will be grouped into a number of 3 zones, each producing a similar number of relevant articles. However, the number of journals in each zone will be increasing rapidly. The relationship between the zones is $1 : a : a^2$ [2]

Another practically useful law in bibliometric analysis is Zipf's law. It suggests that the product of the number of accruable of each word is the body of the text and its name is constant. When C = rf, where r is the rank of a word and f is the frequency of occurrence of the word type and C is a constant. [3]

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2) Rowlewy J.E and Turner M.D., The dissemination of information, Andre division, London. 1998.

3) Wyllas Ronald E, empirical and theoretical bases of Zipf's law, library trends. Vol.- 30., summer 1981, pp. 53 - 64.

Cole and Eales made a comparative study of anatomy literature for the period 1550 - 1860 .They identified the fluctuation with respect to research output among the countries in various years. The results point to the prevalence of international variation in research output performance during the period of analysis. [4]

Hulme analyzed the journal entries in English international catalogue of scientific literature on the basis of growth rate analysis of literature. [5]

Gross and Gross emphasized the importance of bibliometric study of scientific literature and its applications in college libraries. They suggested information about scientific literature

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4) 1.8 Cole and Eales, N.B. The history of comparative anatomy part I : A statistical analysis of the literature, science progress 11,1917. pp. 578 - 596.

5) E.W. Hulme, statistical bibliography in relation to the growth of modem civilization, Grafton, London, 1923.

Can be made easily available to the information seekers.[6]

De Solla Price clarified that science literature has grown exponentially in the last three centuries, with a doubling time of approximately 15 years.[7]

The study of authorship pattern is one of the important features of bibliometric analysis. In this connection, Maheswarappa, et.al. identified the authorship pattern in science and technology research output of Indian scientists. The results indicate the growing trends in multiple authorship.[8]

Sridhar analyzed the authorship pattern in space technology and identified the trends in authorship pattern. The result points out that collaborative research has got increasing attention on the part of the researches.

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6) Gross, P.L.K and Gross, E.M., college libraries and chemical education, science Vol.- 66, 1927 p.385

7) Price Derek J D Solla, little science, big science, columbia university press, New York 1963.

8) B.S. Maheswarappa, et.al collaborative research in science and technology: A bibliometric study, journal of library and information science, Vol.- 9, No.2, 1984, pp. 154 -159

This is highlighted by the decline in the number of single author contributed papers. [9]

Gupta analyzed the entomology literature of Nigeria during 1900-1973 with respect to authorship pattern. This study identified the trends in the number of publication of papers in relation to authorship pattern. The result indicates that there has been a declining trend in single author contributed papers in recent years.[10]

Beaver made a bibliometric study on physics literature with a view to analyze the collaborative endeavor in physics research. The study identified the status of research in physics and output performance.[11]

Menard studied the changes in the rate of growth of

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9) M.S. Sridhar, A study of co authorship and collaborative research among Indian space technology, R.D. Management, Vol.- 15, No.- 3, 1985, pp. 231 - 237.

10) D. K. Gupta collaborative in research output: A review and a case study of collaborative trends of entomology research in Nigeria. 1900 - 1973. INICAF Vol. No.- 1, 1986 p.57.

11) D.D. Beaver, collaborative and team work in physics,Czechos1ovakiajoumal of physics, Vol.- 36,1986, p.14

earth science literature from 1900-1990 and also for the period 1945-70 separately. The result indicates that earth science literature began to grow rapidly with a doubling time of about 5 1/2 years.[12]

Chakraborty analyzed the growth of chemistry literature and identified the trends in its growth over the years. [13] Ulrich international periodical directory examined the growth of bio science literature. The results indicate that 197 countries have produced 68,000 periodicals by the end of the year 1987.

Thereby one understands the rapid multiplication of periodicals publishing bioscience research output in recent years. [14]

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12) H.W. Menard, science growth and change, Harvard university press,1971, p.215.

13) K. Chakraborty, citation analysis of meteorological literature, Lucknow librarian. Vol.-15. 1983, pp. 99 -104

14) Ulrich's international periodical directory, 25th Edition, Bowker's international directory ,1987, New York.

Hall made a study on geo science literature for the period 1945-1970. In this study actual growth rate of geo science literature was analyzed and identified its doubling time as six years.[15]

Parvathama et.al, made a growth rate study on earth science literature for the period 1978-1988. It is observed that the relative growth rate of Indian earth science literature has shown a decreasing trend, whereas doubling time for the Indian earth science I literature has shown an increasing trend.[16]

Ozinou analyzed the growth of man power and frequency of publication in mathematics, physics,

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15) D.H. Hall, Rate of growth of literature in geo science from computerized data base, scientometrics, Vol.- 17,1989,pp.15-38

16) N. Parvathamma and Gunjal S.R., growth pattern of literature and scientific productivity of authors in Indian earth science (1978 - 1988) : A bibliometric study, library science, documentation Vol.- 30, No.- 2 ,1993, pp. 56 - 64.period 1933 - 1966

astronomy and bio sciences relating to Turkey's literature.[17]

Inonu made an evaluative bibliometric study on the contribution of Turkis physicists to the world research output between 1923-1966. Further, the author productivity of physics literature was analyzed with the help of Lotka's law. [18]

Turkel examined the past doctoral productivity of physicists and related social and environmental factors.[19]

Mudkey and Rajyalakhmi made a citation analysis of Ph.D. Thesis of NEERI scientists in the field of environmental science during 1977-1991. The result of

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17) K. Ozinou, Growth in Turkish positive basic sciences 1933 1966, publication of the middle east technical university No.-17, Ankara, 1970.

18) E. Inonu, A bibliography showing Turkey's contribution to physics research in the period 1923 - 1966, publication of middle east university, No.- 24, Ankara, 1971.

19) A .Turkel, The doctoral training environment and post doctorate productivity among Turkish physicists, science studies, Vol.- 3,1973, pp.311- 318.

the study shows that the most concentrated subject area for research is micro biology and bio chemistry followed by engineering and technology. [20]

Gupta examined the Soviet journal geliotekhnika for the period 1965-1975. Here name lists of journal titles were prepared that identified trends in research and scattering of information. Citation analysis was made areawise and the average number of citations per article and obsolescence of literature was also analyzed. [21]

Nagappa and Maheswarappa analyzed the 2663 citations Of 362 articles of Indian phyto pathologists. The study spelt out the types of documents used and most frequently used journals. The result indicates the countrywise distribution of the first 80 cited journals and

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20) V.D. Madkey and Rajyalakhmi, D. Citation analysis of Ph.D. Thesis in environmental science, and engineering used by NEERI scientists during1977 - 1991. Library science and documentation Vol.- 41,No.-2,1994,pp.63 -78

21) B.M. Gupta, Citation analysis of solar energy in USSR, journal of library and information science. Vol.- 2, No.- 2, 1977 , pp. 202 - 219.

chronological scattering of cited articles.[22]

Prakash B. Hadagali observed the citations in Indian journal of agricultural economics. A list of 33 periodicals has been cited at least 5 times. The resultindicates the periodicals most frequently cited by the Indian agricultural economics. [23]

Garfield, et.al., made use of two models in historical research. The first one relates to events in the history of DNA research and counting of citations to key publications.

The result explains that citation studies are valid for creating

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22) Nagappa and Maheswarappa B.S. most frequently cited journals by Indian phytopathologists, journal of library and information science Vol.- 6, No.- 1, 1981, pp. 1-17.

23) Prakash B. Hadagali, frequently cited periodicals by Indian agricultural economics, A citation analysis, IASLIC bulletin, Vol.- 28, No.- 2, 1983, pp.59 - 66.

accurate historical descriptions of scientific fields. [24]

Clark Kenneth examined the psychology literature. The data of literature were correlated with a variety of bibliometric measures with a view to select a panel of psychologists. The result indicates that citation analysis was specifically significant indicating the eminence.[25]

Price on the basis of a sample of chemical abstracts for the period 1910-1960 identified the trends in collaborative research. The result indicates that collaborative work in science shows the trend towards multi authorship and concluded that single author paper would be extinct by 1980 in scientific literature.[26]

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24) Garfield E. Sher, L.K. and Tropie R.J. The use of citation data in writing the history of science, institute of scientific information, Pennsylvania, 1969 , p. 33.

25) E. Clark Kenneth, American psychologists: A survey of a growing profession. American psychological association, Washington D.C., 1957. P.247.

26) Price D.J. De Solla, Little Science, Big Science, Columbia University press, Newyork,1963,pp.86-91.

Whereas elark made a study on bio medical papers and that views given by the Price does not apply to all sciences. In bio medical science the single authored papers were high by the time of Clark's investigation. [27]

Mantan made a study on the earth science literature and identified the growing tendency of multiple authorship.[28]

Baleg made a bibliometric study on agricultural research publications. The author examined the authorship pattern. The result indicates that there is an increase in the frequency of multiauthored papers over a period of 20 years 1955-1978 in agricultural research. [29]

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27) Beverly Clark, multiple authorship trends in scientific paper, science Vol.- 143, 1964 pp. 822 - 24.

28) A.A. Manten, multiple authorship in the earth sciences, atlas 1968, A 149 - A 152.

29) C. Baleg, multiple authorship and author collaboration in agricultural research publications, journal research communication studies. Vol.- 2, No.- 3,1980, pp. 159-168.

Rangarajan and Poonam Bhatnagar analyzed the bibliometric data from the physics abstracts pertaining to morsbaver effect studies. The result indicates that there is a worldwide trend to publish in journals outside the country of origin of the research work.[39]

Praveen Sharma and Garg examined 536 papers published in journals and presented at conferences, symposiam / seminars in the field of solar power. It is concluded that the Indian scientists in this field publish their research findings in journals published from the scientifically advanced countries of the west.[31]

Uzur made a bibliometric Study of 860 publications in physics for the period 1938 - 1983. This study analyzed the productivity and growth characteristics of research in experimental and theoretical areas

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30) K.S. Rangarajan and Poonam Bhatnagar, analysis of media choice the publication of research papers in morsbaver effect studies, journal of library and information science. Vol.- 6, No.- 1, 1981, pp.70 -77.

31) Praveen Sharma and K.C. Garg, bibliometrics of solar power research in India, IASLIC bulletin, Vol.- 38, No.- 4, 1993 , pp. 155 - 160.

as well as different subfields and institutions in the *country.*[32]

Ashok Jain and Garg made a bibliometric study of 785 papers, books and reports in the field of laser in India during 1967-1984. The result indicates that Indian scientists had a few international collaboration in this field.[33]

Sylavin examined the canadian publications in the field of agriculture on the basis of bibliometric analysis. The research identified the actual strength and weakness of canadian literature and areas of research activity. [34]

Nasir, et.al, made a bibliometric study on the agricultural literature publication in Malasia during 1981-1990 .

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32) A. Uzur, A auantitative analysis and Turkish publication output in Physics between 1938 - 1983, scientometrics, Vol.- 19, 1990, pp. 57-73.

33) Ashok Jain and K.C. Garg , laser research in India: scientometric study and model projections, scientometrics Vol.- 23, No.- 3, 1992, pp. 395 - 415.

34) C. Sylvain, Canadian Research Activity: A bibliometric analysis. Scientometrics, Vol.- 27, No.- 3, 1993, pp. 295-311.

The results spell out the fact that key journals publish agricultural research output. [35]

Sengupta and Lalitkumari conducted a bibliometric study on AIDS literature for the period 1976-1986. This study spells out the international channel of communication, medium of communication, contributing countries, membership trends etc.[36]

Bordons, et.al, made a bibliometric study on the publications made by the spanish pharmacologists and their related source materials during 1984 and 1989. The result indicates that scientific output of Spanish pharmacologists has been growing at an impressive rate being almost doubled. [37]

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35) A.M. Nasir, H. Hassan; K.A. Hamid, and S.S. Agba, bibliometric evaluation of agricultural literature published in Malaysia , scientometrics, Vol.- 29, No.- 2 , 1994, pp. 191-217.

36) I. N. Sengupta and Lalitakumari, bibliometric analysis of AIDS literature, scientometrics, Vol.- 20, No.- 1,1991, pp. 297 - 315.

37) M. Bordons, F. Garcia Jover, S. Barrigon, bibliometric analysis of publications of spanish pharmacologists in the SCI (1984 - 1989) scientometrics, Vol.- 24, No.- 1, 1992 . pp. 163 - 177.

Garg and Du tt examined papers published by the Indian agricultural scientists in Indian and Non-Indian journals. Conclusions drawn from the study indicates that the majority of the Indian agricultural research papers to be in plant science and scholarly status of Indian research publications are satisfactory. [38]

Sangam studied the information use pattern in the field of psychological research. This study identified the types of documents used and journals most frequently used by the researchers. [39]

Garg and Rao made a bibliometric study on the contribution of Indian physics laboratory in respect to SCI and NON-SCI covered Indian and foreign journals. The result indicates the key journals of publication and sub areas of physics in which the laboratory scientists

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38) K.C. Garg and B. Dutt, bibliometrics of agricultural researches in India, IAALD Quarterly Bulletin XXXVII No. 3, 1992, pp. 133 - 139.

39) S.L Sangam , Information use pattern in the field of psychology: A citation study, IASLIC bulleting Vol.- 34, No.- 2, 1989, pp. 55 - 63.

have published the maximum papers and pattern of co authorship in the research work. [40]

Deo made a citation study of marthwada University journal during the period 1975 - 1984. The result spells out the information use pattern of the scholars in the field of zoology. [41]

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40) K. C. Garg and M.K.D. Rao, bibliometric analysis of scientific productivity: A case study of Indian physics laboratory, Scientometrics Vol.- 13, No.- 5 - 6, 1988, pp. 261 - 269.

41) V. N. Deo, Citation studies of the marathwada University journal: A case study of the use pattern by scholars. Annuals of library science and documentation. Vol.- 38, No.- 4, 1991, pp. 131 - 147.