Chapter II

REVIEW OF LITERATURE

2.1. INTRODUCTION

This chapter devotes to examine the review of works relating to various aspects of Scientrometric studies. It could be observed that there are various research studies such as Prichard. A to Ranganathan S.R highlighting the importance of Scintometrics analysis and their applications to Library and Information Science. This type of analysis enables the researcher to identify the research gap in the previous studies.

Review of related literature further avoids the duplication of work that has already been done in that area. It also helps one to study the different aspects of the problem. It enables the identification of unexplored areas, in order to create new grounds for research. By considering various dimensions of bibliometric studies, the researcher has presented a review of literature in chronological order.

The first review of the empirical laws of bibliometrics was by Fairthrone\(^1\) in 1969. The second was published by Hjerppe\(^2\) in 1980, which contains more than 200 references to bibliometrics. The most comprehensive historical review was published by Hertzel\(^3\) in the Encyclopaedia of Library and Information Science of the year 1987.
The International Society for Scientometrics and Informetrics (ISSI) has been organizing a series of international conferences on bibliometrics, biennially since 1987. So far eight international conferences have been held at different parts of the World; they brought to light the research papers of bibliometricians\textsuperscript{4, 5, 6, 7, 8, 9, 10, 11}. Khurshid and Sahai (1991)\textsuperscript{12} presented a comprehensive bibliography of bibliometrics comprising more than 400 references. Basu and Garg (2000)\textsuperscript{13} analyzed the trends in the study of bibliometrics /scientometrics during the years 1970 to 1994.

Gomez I, Sanz E and Mendez A (1990)\textsuperscript{14}, reviewed bibliometric analysis of Spanish publications devoted to the nervous system, as covered by the database BIOSIS. Previews of the years 1983-1986, have been performed. An attempt has been made to obtain bibliometric indicators that enlighten the peculiar features of this research subfield in Spain, and they could be used to make science policy decision. From a managerial point of view the main issues approached have shown the differences entangled with a narrow or a broad subfield definition; the uneven research effort distribution inside the country presents contrasts among the few active regions and lack of research in others the identification of the institutions in which this research is performed, their productivity, dynamics and visibility at the international level and
the broad scattering of research teams working in a variety of laboratories inside the institutions. The study concludes that any funding policy aimed at promoting the development of neuroscience has to choose between the “center of excellence” and multiple research points more homogeneously distributed around the country. In any case, a science policy coordinated at different administrative levels would be desirable to attain the regular development of research lines, thus avoiding disperse and isolated research efforts.

Rana Madan and Agarwal$^{15}$ (1994) studied the authorship and collaborative research on Indian wildlife and fisheries. The proportion of single authored papers has decreased from 63.68 percent in 1980 to 52.74 per cent in 1989. During the same period there was an increase in the average number of authors per paper from 1.57 in 1980 to 1.70 in 1989. The degree of collaborative research also increased from 0.36 to 0.47.

Yamazaki (1994)$^{16}$ studied research activities in the field of life sciences in Japan. The result showed that there were 7 journals in which more than 50 papers were published. Brain Research stood first. The ranking list of the contributed papers demonstrates a preference of Japanese researchers’ interest in international journals from
commercial publishers rather than in society journals for their publication overseas.

Nasir et al. (1994)\textsuperscript{17} analyzed agricultural literature published in Malaysia between 1981-1990. The analysis sheds light on key journals that published agricultural literature; they resorted to the communication of their research results in publications. On the subject area they are well written; they further analyzed the nature of contributions made by Malaysian authors, and the publishing practice of corporate bodies and the number of publications produced each year.

Nagarajan (1995)\textsuperscript{18} examined the Research Productivity of Indian Scientists on Marine Biology. He identified Marine science literature at the international level; speaks about the relative growth rate of marine science research output showing their declining trend, contrastingly he shows the doubling time for publications has increased remarkably. The same trend was witnessed in terms of the Indian output.

Gomez, I [et al.,] (1995)\textsuperscript{19} studied production in Spanish biomedical sciences main-stream in the years 1986-1989. A series of bibliometric and socioeconomic indicators were applied to determine
the geographical distribution, the institutions involved and the most active centers specialty using their scientific output, their impact and their basic-clinical type of research. A great heterogeneity was observed between the autonomous communities, with Madrid and Cataluña occupying an outstanding position. This bifocal centralization is stronger when the main-stream research output of hospitals is considered in contrast to the more homogeneous distribution of hospital care. The considered in contrast to the more homogeneous distribution of hospital care. The consequences of these observations are discussed. The average level of the Spanish research output is basic; clinical papers are mostly published in their national journals which are scarcely covered by the database output per specialty and the causes of mortality and morbidity. The indicators for each particular centre are compared with those of the whole of Spain for each specialty in order to find ‘centers of excellence’. Spanish research papers published in journals of a similar impact to those used by other European Union countries, although the number of citations received is much smaller, as has already been observed for other disciplines in Spain and peripheral countries.

Kundra (1996) investigated collaborative research trends in Indian Medical sciences 1900-1945 and drew general and broad
conclusions. The growth pattern suggested to him that a large proportion of co-authored papers in a discipline; to some extent, it was based on the type of research and the discipline involved. As a result, it is possible to have a relatively lower proportion of collaborative papers in particular sample, even when collaborative research overall has become the normal practice.

Qin (1997)$^{21}$ made a study of the relationship between research collaboration and the interdisciplinary nature of articles published in scientific research and the results show that there were significant differences in the degree of the interdisciplinary literature published and the level of collaboration of authors with their colleagues. A significant relationship was found to exist between interdisciplinary articles published.

Vickers (1998)$^{22}$ determined the following features of randomized trials in complementary medicine: the extent to which they are indexed on Medline, the journals in which they are published, dates of publication, the therapies and conditions were most commonly the focus of study. Bibliometric analysis of the registry of randomized trials of the Cochrane Collaboration field in Complementary Medicine and the number of trials in each category. There were 3774 randomized
trials on the registry of which 3072 (81%) were indexed in Medline search. However, only about a third of these references could be easily found in a Medline search. Trials were published in a total of 965 different journals. Most trials (84%) were published in conventional medical journals. The number of trials is increasing with variation in the number of trials for different complementary therapies. There were a high number of trials in acupuncture (554) but a few trials in aromatherapy (47) and osteopathy (18). There were many trials on cardiovascular disease (501), musculoskeletal disorders (386) and surgery-related symptoms (293), but few in fatigue disorders (11).

Chapula [et al.,] (1998)\textsuperscript{23} analyzed the preliminary result of a bibliometric analysis of AIDS literature produced in and or about Latin America and the Caribbean for the period 1980-1996. Findings show that leading countries in AIDSLINE were Haiti, Brazil, Monaco and Presto Rico. The distribution by year of publication showed a decrease in Haiti, from 54 in number in 1983, to 4 in 1995. The countries either increased or maintained an average production throughout the years.

Ravichandra Rao (1998)\textsuperscript{24} analyzed a small sample of 12 data sets. He made an attempt to identify a suitable model to explain the
law of scattering; among the various models tried, long normal fits much better than many models including the log-linear model.

Yurtsever and Gulgoz (1999)\textsuperscript{25} identified the scientific publication of 231 chemistry professors employed at a Turkish University for a period of 10 years. They concluded that even though these exists a serious increase in the scientific output from Turkey, a rather small portion of the studied group is responsible for high number of publications and of higher quality.

Tapaswi and Maheswarappa (1999)\textsuperscript{26} analyzed 2475 Indian oceanographic research contributions. The result showed that there is a shift in the number of contributions among the disciplines of oceanography and the forms of documents. The increase in the number of scientists did not proportionately bring about an increase in the number of contributions. Single authored contributions tend to decrease. The number of tables and figures in the contribution are yet to stabilize.

Lal and Panda Krushna (1999)\textsuperscript{27} analyzed citographical comprising 3023 references. The study has shown that the verbal formulation of the study was closer to the graphical formulation. The graphical formulation confirmed Bradford’s law of scattering and
demonstrated a very meager strength of only nine most productive core periodicals. 1.43 percent of the total periodicals in nuclear zone have 37.5 percent of the total periodical citations.

Karki etc., (2000)\textsuperscript{28} all investigated Indian organic chemistry research activity during the period 1971-1989 using Chemical Abstracts. It attempts at quantifying the national contribution as well as those of the worlds identifying areas of relative strengths and weaknesses and also models the growth of Indian Organic Chemistry output to that of world organic chemistry as a whole and in sub fields where the activity index for the World and India are similar.

Sternberg (2000)\textsuperscript{29} studied the empirical use of Bradford’s law for decisions concerning information systems in problem based fields. Results of comparison of the course in different fields can be used as a base for tailoring the information system. The results show that Bradford analyses can be useful tools in developing information systems.

Garg and Padhi (2001)\textsuperscript{30} analyzed 3174 peppers published in journals in the field of laser science and technology. It indicated that only 401 papers were single authored and the rest 2773 were co-
authored papers. Of the 2773 papers only 687 were published in
domestic journals and others in International ones.

Ugolini [et al.,] (2001) \(^{31}\) studied the distribution of papers
published by European (EU) authors in ophthalmologic journals from
1995 to 1997. The impact of ophthalmologic research in the EU is
compared with that produced in other countries; and trends of research
are highlighted through key words analysis. They were 11, 219 papers
published in words in the ophthalmologic journals of which 34.8
percent came from the EU (UK, Germany, France, Italy, and the
Netherlands ranking at the top) and 40.7 percent from the US. The
mean Impact factor of EU papers was 0.8 in comparison with 1.5 in the
US.

Arunachalam and Jayshree (2001)\(^{32}\) examined fish and
aquaculture research in the Peoples Republic of China over the six
years 1994-1999 using data from six data bases -three abstracting
services and three citation indexes. The results are compared with fish
science research in India. During those six years China has published
2035 papers and India 2454 more than 95 percent of China’s papers are
journal articles, compared to 82.8 percent of Indian papers. Above 78
percent of China's journal paper output has appeared in 143 domestic journals compared to 70 percent from India in 113 Indian journals.

Parameswaran and Smitha (2001)\textsuperscript{33} made a bibliometric analysis of Library and Information Science Abstracts for the years 1994-1998. Their findings were: maximum number of publications fell under broad fields ‘information and communication technology’ with 13.41 percent coverage; more people wrote individually; single authorship amounted to 71.5 percent and double authorship was 15.83 percent indicating that solo research predominates in the field of LIS; and the portion of Indian contribution to LIS research was very meager (1.14 percent).

Marshall A. Lichtman and David Oakes (2001)\textsuperscript{34} conducted a study to compare the “productivity” of a cohort of research grant applicants selected by peer review to be scholars of the Leukemia Society of America (now The Leukemia & Lymphoma Society) with a matched twenty-four scholars and 124 nonfunded applicants. Two bibliometric variables and their derivatives were examined from the number of citation to those papers. Published papers were measured through December 31, 1999, and citation count to these papers through December 31, 2000. Scholars published 10,301 papers through the
period of observation and nonfunded applicants published 6442 papers and they were cited 245,586 times. The mean citations per paper were 52 for scholars and 38 for nonfunded applicants.

Macias – Chapula and Muangos- Nolasco (2002) \(^{35}\) analysed AIDS documents produced in sub-saharan Africa. Results indicated a high pattern of collaboration through multiple authorship. Most documents were published in English (84.50 per cent) and French (14.73 per cent). Over 57 percent corresponded to journal articles. The subject content of the documents was mainly focussed on epidemiological, complications, and prevention and control issues on HIV infections and Acquired Immune Deficiency Syndrome.

Uzun (2002) \(^{36}\) surveyed a set of ten scholarly journals that publish the mainstream of papers in the field scientometrics, informetrics and Bibliometrics. The results showed that University of Sheffield, the University of North Carolina (USA), the University of Leinen (Netherlands), the City University of London (England), the National Institutions of science, Technology and Development studies (India), the University of Sussex (England), the University of Illinois (USA), the University of Michigan (USA), the Hungarian Academy of
Sciences library (Hungary), and Indiana University (USA) emerged as the ten most productive institutions for the period 1981-2000.

Arunachalam and Gunasekharan (2002)\textsuperscript{37} made a bibliometric study of Tuberculosis Research in India and China, and identified that there was a tremendous mismatch between their research efforts.

Shukla, Saksena and Riswadkar (2003)\textsuperscript{38} discussed the various features of the quarterly, international journals on Tropical Agriculture, published during the years 1991-2000, analyzed the year wise distribution of papers, authorship pattern, year wise distribution degree of collaboration, the geographical location of contributors, the types of affiliation, average length of articles and study of references.

Gupta and Dhawan (2002)\textsuperscript{39} carried a study of research collaboration between India and China. It was evident from the rise in the member of co-authored papers from 21 in 1994 to 74 in 1999 that S & T collaboration between India and China had been taking place mainly through multilateral channels and the output through bilateral channels was very small (11.7 per cent).

Grossi, O. Belvedere and Rosso (2003)\textsuperscript{40} highlighted the geography of publications in clinical cancer research from 1995 to 1999. A Medline search was performed to retrieve papers in clinical
oncology reporting I, II and III studies published between 1995 and 1999. For each country, the total number of papers, the total Impact Factor (IF), and the mean IF were determined and similar calculations were performed to compare the European Union versus North America.

Suryanarayana (2003)\(^\text{41}\) studied the authorship pattern of Azadirachta Indian literature. The study revealed that the collaborative research is more favored than solo research.

Kim(2003)\(^\text{42}\) examined the productivity of Korean researchers in physics and the study identifies the type of authorship and their collaboration pattern influence the choice of sources cited by Korean scientists.

Inoun and Kurnaz (2003)\(^\text{43}\) carried out a comparison between the scientific production of Turkish physics in the periods 1961-1971 and 1994-2000. The results show that in 30 years, appreciable increases have occurred in the number of collaborative authors making significant contributions.

Anestis Mavropoulos and Stavros Kiliaridis (2003)\(^\text{44}\) explored orthodontic literature in orthodontic and other dental and medical journals from 1981 to 2000. About 16,000 articles with orthodontic
interest were published during this period. The numbers of orthodontic articles written in English rose during this period, but almost half of them (45%) were published not in orthodontic journals.

Omwoyo B. Onyancha and Dennis N. Ocholla (2004) explained descriptive informatics, HIV / AIDS research in Uganda and Kenya and compared country, publication type and date, institutional affiliation, published sources, size of publications, by gender, and nature of research collaboration. Research funding plays a major role in the creation of relevant research centers in these countries and in financing research projects and research affiliates. Most publications are coauthored and focus on women, and a large proportion of HIV / AIDS documents are coauthored.

Su-Ru Chen, Wen-Ta Chiu and Y.S. Ho (2005) discussed the output associated with research on asthma in children. The data encompassed the period from 1881 to 2002 and were extracted from the Science Citation Index online version. Selected documents included ‘asthmatic children’ and ‘asthma children’ as a part of its title, abstract, or keyword. The US was the world leader and had most of the publications, followed by the UK.
Francisco Lopez and Munoz [et al.,] (2006)\textsuperscript{47} carried out a bibliometric study of scientific publications in relation to bipolar disorder. They selected documents using the EMBASE and MEDLINE database. Selected documents included the descriptors bipolar disorder*, bipolar illness, bipolar patient*, bipolar main*, bipolar depress*, bipolar spectrum, manic-depressive*, and rapid cycling. They applied Price’s Law on the increase of scientific literature, or the participation index (PI) of the different countries. The bibliometric data from the countries that have prolific scientific production, such as number of physicians, total per capita expenditure on health and overall volume of production in the field of psychiatry. A total of 4270 original documents published between 1980 and 2004 were downloaded, of which 1825 corresponded to aspects related to drug therapy. Their result state scientific production on bipolar disorder show exponential growth (correlation coefficient $r = 0.947$, as against an $r=0.849$ after linear adjustment). The drugs most widely studied are lithium (1351 documents), valproate (544), carbamazepine (493), lamoticipation index, PI = 44.2).

Matthew E. Falages and George Panos (2006)\textsuperscript{48} studied chronic conditions such as heart disease, stroke, cancer and asthma in developed countries. Parasitic and tropical diseases remain a major
burden of diseases that overwhelm medical services and economic resources in developing nations. This is an ongoing problem, despite the success of some programs to reduce the incidence of parasitic diseases such as onchocerciasis in Africa, dracunculosis in Africa and Asia and the global effort for elimination of lymphatic filariasis.

Alberto Cambrosio [et al.,] (2006)\(^49\) described Cancer research as one of the principal targets of translational research, yet the nature of the relationships between different forms of cancer research remains controversial. The paper examines publications on cancer during the period 1980-2000. A network software program was used to map evolving patterns of inter-citations between cancer publications, their different research levels and the transformation of their relational content. Both inter citation and content maps provide striking evidence of consolidation in the 1990s of a translation interface that was practically non existent a few decades before.

Falagas, et al (2007)\(^50\) focused studied tropical medicine as it has a ongoing history. They estimated the contribution of different world regions to research published in the main journals of tropical medicine. Using the PubMed and the Institute for Scientific Information (ISI)'Web of Science’’ databases, they retrieved articles from 12
journals included in the “Tropical Medicine” category of the “Journal Citation Reports” database of ISI for the period 1995-2003. Data on the country of origin of the research were available for 11,860 articles in PubMed (98% of the articles from the tropical medicine category). The contribution of different world regions during the studied period as estimated by the location of the affiliation of the first author was: Western Europe 22.7%, Africa 20.9%, Latin America and the Caribbean 20.7%, Asia (excluding Japan) 19.8%, USA 10.6%, Oceania 2.1%, Japan 1.5%, Eastern Europe 1.3%, and Canada 0.6%. The contribution of regions, estimated by the location of the affiliation of at least one author of the published papers (retrieved from the ISI database), was similar: and Asia 23.3%. The mean impact factor of articles published in tropical medicine journals was the highest for the USA (1.65). Their analysis suggests that the developing areas of the specific geographic distribution of diseases still need help by developed nations to produce more research in this field.

E. Sanz-Casado et al. (2007) \(^5\) reviewed and mapped the trends in research on prison diseases applying bibliometric tools to the scientific literature published between 1973 and 2002. The data for the study were obtained from the Medline database and its aim was to determine the volume of scientific output in the above period, the
countries involved and the trends of the subject matters addressed. Significant growth is observed in scientific production since 1991 and particularly in the period between 1996-2001 and the countries found to have the highest output are the United States, the United Kingdom, Japan, France and Germany. The collaboration networks established by scientists were also analyzed in this study.

Swapan Kumar Patra and Prakash Chand (2007)\textsuperscript{52} explained the growth over a time period AIDS research output in India based on bibliographic data from Pub Med and Web of Science. Authorship distribution was examined using Lotka’s law Bradford’s law of scattering was used to identify core journals. The study identified active institutions and statewide distribution AIDS research in India.

Bonilla-Calero, (2008)\textsuperscript{53} describe a “scientometric” analysis of a sample of research output in Physics taken from the institutional repository of the University of Strathclyde (“Strathprints”). The documents in this sample were authored over the period 2000-2005 but were deposited in the repository during the period from publication up to 2007. The above paper aims to analyse these data bibliometrically.
Serenko, and Bontis, (2009) documented attempt to develop a ranking of knowledge management and intellectual capital academic journals through a survey of field contributors.

Houy, et al (2010) analyse the development of the research field a systematic literature review of empirical journal articles in the BPM context is conducted. The retrieved literature is analyzed by means of scientometric methods and a developed reference framework.

Repanovici, (2011) define the scientific production and productivity, and to present the main indicators for the measurement of the scientific activity. The impact of the research is to be measured and analyzed through citation analysis.

Mulla (2012) has described the bibliometric analysis of 998 articles of on information science and scientometrics (ISS) that appeared in different journals during the period of 2005-2009. The study reveals that, most researchers preferred to publish their research results in journals; as such 91.98% of articles were published in journals. More numbers (329, 32.97%) of articles were published in 2009.

Serenko, (2013) Scientometric KM researchers should use advanced empirical methods, become aware of prior scientometric
research, rely on multiple databases, develop a KM keyword classification scheme, publish their research in KM-centric outlets, focus on rigorous research of the forums for KM publications, improve their cooperation, conduct a comprehensive study of individual and institutional productivity, and investigate interdisciplinary collaboration. KM-centric journals should encourage authors to employ under-represented empirical methods and conduct meta-analysis studies and should discourage conceptual publications, especially the development of new frameworks.

2.2. CONCLUSION

From the foregoing review of literature, the following inferences could be drawn:

i. The Early research on Scintometrics/bibliometric studies was by individual authors. Of late, the research tends to be collaborative in nature like any other scientific discipline.

ii. The research by Indian scientists on Bibliometrics/ Scientometrics / Informetrics shows an increasing trend.

iii. There is a shift from analyzing the research output from the macro level to micro level.
iv. The studies are mostly concentrated on data drawn from databases, individual journals, individual country’s research output in a particular field of knowledge, individual subjects world output, individual authors’ publications, etc.

v. The sophisticated and highly mathematical analysis of data is made possible by the bibliometricians may be due to the availability of software packages such as SYSSTAT, SPSS and so on.

vi. Lastly, it was found that, no study on the subject of Leprosy disease research productivity has been attempted.

Therefore the investigator has chosen this subject field and analyzed the productivity of Leprosy disease research covered in the Pub Med.
REFERENCES


48. MATTHEW E. FALAGAS & GEORGO PANOS (2006),


