CHAPTER 7

SUMMARY AND CONCLUSION
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For the existence of human beings, research in all fields of study is a primary necessity. The importance of library and information science has been recognised as an important tool of research. Busha¹ pointed out that librarianship had no long tradition of research. Borden² believed that there is a wide scope and need of research in the field of library and information science, viz. library building, library management, journal subscription, policy survey of library users need, assessment of reading habits of readers, use of documents, collection and preservation of documents and so on. Findings of researches in these fields can help in giving better services to library users.

Bibliometrics, a subdiscipline of information science, deals with organisation, classification and quantitative evaluation of publication patterns of all macro and micro communications along with their authorships by mathematical and statistical calculus. 'Bibliometrics' is analogous to Ranganathan's 'Librametrics', but literary speaking librametry primarily aims at the quantitative analysis of the management of libraries and bibliometrics is limited to recorded knowledge. Bibliometric work in library sciences covers 39.97 percent followed by natural science (17.25%),
medicine (4.99%), chemistry (4.26%), physics (4.13%), social sciences (2.86%), generalities (2.46%) and other subjects 17 percent.\textsuperscript{3}

There are three fundamental laws which actually laid the solid foundation of bibliometric distributions. They are:

1. Zipf's law in linguistics dealing with frequency of occurrence of words in a research paper, books, documents, etc.,
2. Lotka's inverse square law of scientific productivity of authors in terms of scientific papers,
3. Bradford's law of scattering scientific papers over different journals.

Citation analysis is one area of bibliometrics. It is a technique of ranking scientific periodicals according to their degree of importance. Ranking of periodicals has its manifold usage. It helps the scientists of the field and also the librarian attached to an organisation engaged in research in that field. Citations are actually predictors of demand. It should not be used as a measurement of quality, significance or importance of a research paper or article. Citation counting techniques are used in the evaluation of scientific activities for the last few years. The main objectives of the citation analysis are to evaluate and to interpret citations received by articles, authors, institutions and other aggregates of scientific activities. It is also used as
a tool for measuring communication links in the sociology of science.

The use of citation frequency as an index of the significance of the cited document is based upon certain assumptions. 4

(1) The subject content of the cited document is related to that of the citing document.

(2) The number of times a document is cited is directly proportional to its value or intrinsic worth.

(3) The primary or secondary publication used as the base for deriving citation data is representative of the entire subject field.

(4) If more base publications then one are used, then all of them can be weighed equally.

(5) All publications cited have actually been used by the citing author.

(6) All publications used in preparation of the citing documents have actually been cited.

Brittain and Line 5 have categorized the various types of citation analysis and their possible applications. Analysis of the bibliographic citations can be used in the following types of studies:

(1) identification of key documents and creation of core lists of journals,

(2) study of the coverage of primary journals and other material in secondary services,
(3) clustering of documents according to common references and citations,

(4) study of the attributes of literature including growth rate, obsolescence, citation practices,

(5) study of the structure of scientific literature according to language, country of origin, age, subject, form, authorship or any combination of these attributes,

(6) study of the historical and sociological aspects of scholarly communication in science and technology.

The citation analysis, for the purpose of this study, is taken in view of the parameters given above. In this work the analysis of the citations or references which form the part of the articles in journals have been done. It is not taken to include study of reference appearing in secondary periodicals. Citations in journals explicitly state a connection between two documents, one which cites and the other which is cited, whereas citation of secondary journals does not usually imply any connection between documents. The citation analysis is largely used for putting things in order. The things ordered can be journals, articles, books, authors, organisations, etc. The type of ordering can be linear as in ranking or multidimensional as in citation networks. Studies of obsolescence rates of journals or documents may be considered to be special case of ranking.

Books and periodicals are undoubtedly the foundation of scholarship in the twentieth century. Surveys regarding
the literature habits of researchers indicate that periodicals are the most frequently used information. More money is spent on periodicals than on books by a university library. There is no reliable estimate of periodicals in all languages all over the world. The proper utilization of periodical resources needs to be examined carefully. The most serious cause for concern for future is the inflationary spiral of prices of periodical subscription on one hand and more or less stationary budget of the Indian university libraries on the other. Therefore, it is of utmost importance to university librarians, authorities and all those who are concerned with periodical literature to pay attention to this problem.

It is high time that studies are conducted to find out the utilization level of periodicals publication in libraries. The objectives of the present study is to note the materials used in writing research papers in economics to identify key documents, to study growth rate, citation practices, to study language, country of origin, age, subject, authorship, etc., to find some important core journals, core contributors, core contributions, etc. The data were also analysed to find out the number of citations to different forms of literature, i.e. periodicals, books, conference proceedings, government publications, theses, manuscripts, etc. To determine certain attributes statistical analysis like arithmetic mean, median, range, age of citations, Pearsonian coefficient of skewness have been calculated.
In selecting the source literature from which data are collected it was decided to take citations from research journals published in English language. The citation analysis comprising 22696 citations (Table 1.4) was done manually by noting them on cards. The following source journals from 1986 to 1990 were selected for collecting the data.

1. The American Economic Review.
2. The Economic Journal.
5. The Indian Economic Review.
6. The Indian Journal of Economics.

Review of bibliometrics, with special reference to social sciences have been done. During the period 1964-1990 a very few (11.41%) papers on bibliometrics researches in social sciences have been published as compared to other subjects (89.59%) (Table 2.1). Social scientists make greater use of the older literature than do natural scientists, but in the experimental areas of social sciences, the obsolescence rate is closer to that in the natural sciences (Brittain). The growth of social science literature has been slow with a slight acceleration after second world war. In Anthropology interdisciplinary analysis yielded about a 70% centrifugal
tendency; that is 70% of cited literature in anthropology was drawn from other disciplines (J.M.Choi). 8

Economic literature has wide range of forms like books, monographs, periodicals, conference papers, festschriften, unpublished items such as theses, research reports, working papers, etc. In certain subdisciplines, the publications of national governments and international organisations, in others, newspapers or statistics publication may also form sources.

Fletcher 9 reported two percent growth rate per annum of monograph publication in economics between 1920 and 1958, while periodicals (1928-1968) had an annual growth rate of about four percent. Since 1968 several important economic periodicals have come up, so this rate has probably risen slightly in recent years. According to an estimate 6688 periodicals in economics are published (Ulrich 1987-88). Like any other academic discipline there has been phenomenal increase in research and scholarly output in the field of economics in recent years. The quantum of journal growth in economics is like that in any other developing science. The number of journals in economics have increased from 2851 (1969) to 6688 (Table 3.1).

There are 33 countries publishing 30 and more journals of the different fields of economics. It means that 87.8 percent of the total number of journals of economics is
covered only by 33 countries. The largest number of journals (35.67%) in economics are published from USA followed by the United Kingdom publishing 8.28 percent of the total number of journals. India ranks sixth with 3.36 percent of total publications in the ranking order (Table 3.3). It can be said that the position of India in economic researches is better than many countries. English is the prominent language in which 58.79 percent of the periodicals in economics are published (Table 3.4).

In economics highly researched area is the field of international trade (17.72%), followed by industrial economics (17.16%), financial economics (15.86%), labour economics (12.06%), macroeconomics (11.69%), economic theory (8.91%), social economics (6.86%), economic development (6.22%), public finance (2.60%) and business management (0.93%) as shown in Table 4.2.

The analysis of bibliographical citations is fairly a common investigative technique used by librarians, information workers and science policy researchers for variety of applications. To begin with the analysis trends of citations over the past five years from 1986 to 1990 a large body of data have been collected. From 1078 research articles taken from the six source journals, the distribution of the 22696 references cited are displayed in Table 4.3. The table indicates that the maximum of 6674 (29.42%) references have been cited in 'The Economic Journal' followed by 'The American
Economic Review' with 6163 (27.15 %) references of the total citations.

Out of 22696 citations 12735 are cited from journals, which is 56.11% of the total citations. Citations from sources other than primary journals are 9961 (43.89%). The importance of books in economic researches is evident which is 54.16 percent of citations other than journals. It is evident from the table 4.8 that the highest number of citations is to the journals published during the years 1981-85 which comes 34.25 percent of the total citations of journals.

In this study 1078 research articles published during 1986 to 1990 in six source journals with 12735 journals citations have been counted and arranged in ranking order. Only the names of those journals cited ten or more times are included in the list (Table 4.10). Journals listed may be considered the media of choice for the reporting now economic knowledge and they can be regarded as core journals. It can be a reliable tool for the selection of journals in economics in order of their impact on current researches in the subject. In the present study 743 titles have been noted and out of these, the first 121 titles have been listed in table 4.10. It is also evident that the first 121 periodicals listed in the ranking order covered 89.34 percent of the total citations from periodicals (11378 out of 12735) and 50.13 percent of the total documents referred to (11378 out of 22696) in the Table 4.10.
Perusal of the table 4.11 provides an analysis of countrywise distribution of the journals in the ranking list. Five countries namely USA, UK, Netherlands, India and Switzerland are the main producers in that order, of journals in English language. They constitute the important media for communication of new knowledge in economics. United States of America and UK lead, followed by Netherland, India and Switzerland. Journals from advanced countries of Europe and Asia show lower percentage of citations which may be due to language problem.

The median ages by year of publication of all the journals under study show a pattern of decreasing age in years of the citations indicating that citations are more current in the earlier years. Such use of more current citations may represent increased research activity in economics. For all the citations, 1986-1990, the median age is 9, 8, 9, 14, 13, 13 for Amer. Econ. Rev., Econ. J., Oxford Econ. Pap., Indian Econ. J., Indian Econ. Rev., and Indian J. Econ. respectively (Table 4.12). This indicates that econometricians use non-current citations. It also indicates that the citations from foreign journals are more current than that of Indian journals. Citation as old as 177 years has been observed. The pearsonian coefficient of skewness in all cases is positive except in the case of Oxford Econ. Pap. in the year 1986 (-0.07 Table 4.12). The skewness indicates that as the periodicals become older, they are used less frequently.
Perusal of the table 4.19 indicate that in foreign journals the concentration of citations in the first three age groups 0-4; 5-9; 10-14 account for 69.7 to 78.3 percent of total number of citations. After the age group 5-9 years, the proportion of citations belonging to the older age groups begin to decline. In Indian journals for the same age groups the percentage citations range from 52.6 to 58.4 percent of the total number of citations which are quite low in comparison to foreign journals. Another notable important point is that after the age groups 5-9 years, the proportion of citations belonging to the older age groups begins to decline in the case of foreign journals, while this decline starts after the age group 10-14 in the case of Indian journals (Table 4.19). This indicates that more older citations are cited in Indian journals which are the main source of communication of Indian econometricians.

The largest number of articles in economics have been published by single authors (675 about 62.61% of the total citations). The remaining 325 (30.15%) are by two authors and 78 (7.24%) by more than three authors (Table 5.1).

The total number of times an author was cited could not be used to judge its value, whether cited a thousand time or never cited. In this study only cited works could emerge and even at that, the number of citations alone could not be a determining factor in assessing worth of importance. However,
citation frequency', when coupled with 'citation duration' has proved to be a better way to measure the worth or impact of a writing. This must not be considered as the best, but only as an improvement however slight this might be.

This study reveals that a few authors are highly productive and majority had produced less than 10 papers. It has been observed that there are 106 authors (Table 5.2) who are cited at least 10 times. The works of 37 authors which are most often cited in the network and who can be regarded as productive authors are predicted in the list given below.

Table 5.2 shows a total of 2962 citations in the network of 106 authors. Out of these there are only 27 articles of 19 authors which were cited at least 10 times. These 27 works have been listed below in decreasing sequence of the citations. The number in parentheses at the right of each author indicates the number of times that the work appeared in the network. They may be regarded as core articles in the field of economic researches.

1. Baroo, R.J.  (30) Are government bonds net wealth ?
   J. Polit. Econ. 82 ; 1972.


   J. Polit. Econ. 84 ; 1976.


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Total 27

If we tally this list with Table 5.2 it may be observed that the ranking order has changed except Barroo, R.J. who gets top ranking in both cases, i.e. in author citation and article citation. Lucas, R.E. getting second position in rank falls down on 8th position on the basis of work and Stiglitz, J.E. gets the second position. The same happened with other authors. Thus the total number of times that the name of an author was cited could not be used to judge his value but his particular work may be judged on the total number of times it was cited. This group of, 27 work, works of 19 authors may be called 'classics'.

It can be said that J.M. Keynes, M. Friedman, L. Hobbins and J.R. Hicks are the 'classic authors' in the field of economics. An Indian A.K. Sen also occupies very high rank amongst authors of books (Table 5.3). Some of the books which have been cited 10 or more times are listed below.
The government of India since independence has made efforts to stimulate research in economics and to relate to...
problems of development. Universities and research centres have been financed by state and Federal governments in order that studies may be undertaken on development problems and in order to accumulate scientific knowledge on various aspects of Indian economy.

Out of the total output (6688) of periodicals published throughout the world 225 periodicals are published from India and ranks sixth amongst periodical publishing countries in economics (Ulrich 1987-88). The study based on 366 research articles published during 1986-1990 in Indian Econ. J., Indian Econ. Rev. and Indian J. Econ., out of the total 5180 citations, (Table 6.3) 50.17 percent are the citations from journals and 49.83 percent are from non-journal materials. It is observed that trend of citing documents in foreign and Indian periodicals is the same. The foreign journals play important role in communicating information to Indian researchers of economics. It is evident from the fact that they occupy 1 to 11 positions in the ranking list (Table 6.5) indicating thereby that Indian researchers cite more often the foreign journals. The oldest journal published from India 'Indian J. Econ' (1916) gets 26th position in the ranking order, while Economic and Political Weekly is 5th in position. Other Indian Journals which get place in the ranking order are Indian Econ. Rev. (12), Indian Econ. J. (14), Indian J. Agr. Econ. (16), Arthvijnan (36), and Sankhya (45).
The first 54 journals as per Table 6.5 cover 78.79 percent of the references cited in Indian source journals in the field of economics. Out of 78.79 percent of the total references, the role of Indian journals is only 7.05 percent. This indicates the degree of importance of Indian journals in the field of researches in economics and dependence of Indian workers on foreign journals.

The most highly researched area in India in economics is in production (Agricultural and Industrial) which accounts for 23.5 percent of research work. International trade (18.3%) is in the second position. Financial economics (money and banking 16.67%) and macroeconomics (13.93%) are in the third and fourth position respectively (Table 6.7). Researches in labour economics get 8th priority in India while it occupies fourth place in foreign countries. In general researched area follow the same trend in India and in foreign countries.

In Indian journals, the incidence of single personal authorship (75.68%) is much more in comparison to two or more authorship which is 24.3 percent (Table 6.8). The analysis shown in Table 6.9 reveals that a very few authors have been productive and majority have published five or six papers. Only six percent authors have been cited for 15 or more times.

Citation analysis is a very useful tool in the selection of journals and other types of documents. However,
two important factors have to be kept in view while interpreting the results of citation analysis for collection development purposes.

First, all citation-based measures of significance have a common limitation: the use of journals is strongly influenced by their availability. Authors of papers cite those journals that become known and available to them through personal subscription, library or reprint dissemination. An indeterminate quality of journal literature pertinent to their work may remain unused by authors because of language, geographical, cultural or other barriers. These limitations also apply to other types of publications.

Second, the importance of a journal to an individual user or group of users is subject to change with time because of changes in user's interest or in journal's scope and quality. Hence regardless of the measure of significance used ranked list of journals have to be revised from time to time.

Citation studies on the significance and obsolescence of scientific and technical literature are especially helpful in developing and managing collections. Like any other evaluation tool, citation frequency should not be used in isolation. Like one scale on a monogram, it must be used along with other scales to obtain anything useful or meaningful particularly if the object of the evaluation is in any way qualitative.
This study may raise questions about other subjects and it is hoped that this investigation will inspire further research for others who may be interested in under taking such studies. Data presented on citations, core journals, core authors, core articles may be useful for researchers in economics.
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