CHAPTER - 1

INTRODUCTION

Knowledge is a human resource which has the ability to consolidate the valuable results of human thinking and civilization through different times. It is the totality of understanding of nature and its features for improved quality of life of human society. Because of this, knowledge has been increasing in volume, dimension and directions. The term 'information' and 'knowledge' are often used as if they are interchangeable. Information is 'potential knowledge' which is converted into knowledge by the integration of memory of human beings. In modern times there is a confusion on knowledge usage. Therefore an understanding of the concept 'knowledge' is needed for formulation of strategies in information science.

'Information' is defined as a thing, a process and an unobservable mental state of process. In real world we observe aspects of phenomena as 'facts' and represent them by 'data' to create 'information' and this is communicated to recipient as 'knowledge' and used for creating new facts thus forming a continuous process. Before the invention of printing, knowledge was in the form of personal knowledge and disseminated through discussions. By the invention of printing, knowledge became depersonalised and 'documents' became channel for dissemination of knowledge. The universe
of knowledge is expanding rapidly with application of modern technologies. Knowledge is needed for many reasons - curiosity for new information, problem solving and decision making.

The dissemination of knowledge has been a matter of grave concern in Library and Information Science development due to 'knowledge explosion' or 'knowledge fragmentation'. The vast store of knowledge has been organised by human society in an external memory in the form of various sources so that they can be utilised in times of need. Organisation of knowledge in spite of its exponential growth is a great task and should take into consideration the needs of the users. Information science is to help the users find their way in the present environment of scientific knowledge which developed due to the advancement of technologies. Knowledge based organizations procure, organise, maintain, analyse, create, present, distribute and apply information for which they acquire various types of knowledge. There is need for clear statement of policy for management of information and knowledge.

In the 17th century, scientists developed an interest in working together and they began to form associative gatherings to communicate research results to one another and the world at large. The modern journal is a direct result of this development. The first journals published were 'Journal des Scavans' and 'The Philosophical
Transactions' which started in 1665 [1]. By the end of 17th century, about thirty scientific and medical journals were published. In the 18th century, the specialized journal became common. The problem of proliferation of literature was tackled by scholars narrowing their fields of interest by increasing their degree of specialization. Thus research papers with the characteristic system of citation took shape in the 19th century. The papers were of high quality giving account of original investigations.

Research in any field is not complete without getting information about similar research done elsewhere in the world. The trend of research has grown to global collaboration. Hence a number of international conferences, symposia, seminar etc., are being conducted every year on different topics of science. Scientists attending international training programmes are increasing. Thus the advancement of science from "little science to big science" occurs by "standing on the shoulders of giants" as put forward by Price [2]. Accordingly the growth of scientific journals also became exponential along with the growth of research. Journals which were first published by professional societies only have to compete with commercially published profit making titles. At present the journals in science and technology field is about one lakh, as covered in the Ulrich's International Periodical Directory, 33rd edition. The trend shows that other documentary forms like reports, thesis, patents and films
are also increasing. Although the amount of literature grows, the time one has to read them remains the same. So there has to be an effective method of selection for dissemination of literature. Another factor which necessitates selection is the increasing cost of scientific publication. Along with growth of literature there is a scatter of literature. In many scientific fields, due to interdisciplinary research the results published in journals are peripheral to the subject. This also stresses the need for selection of literature by applying scientific methods.

Growth of knowledge in Fishery science, can be traced back to prehistoric times when man used fish as food. Next man learned to catch fish using traps and nets in lakes and rivers. Gradually, by improvement in equipments fishing extended to seas. Mechanisation of fishing in the 19th century brought about revolutionary changes and now application of computer for various operations have become common. All these developments led to increased fish catch which is estimated as 98.7 million tonnes all over the world and India's share is 4.2 million tonnes in 1992 [3]. Similar to other scientific disciplines, specialization in Fishery science has enabled the origin of specialized journals as communication vehicles. Results of research are published as reports, bulletins, thesis and scientific journals. Special publications to meet specific needs are also coming out. Some of the earlier publications are the Canadian
publications— one, progress report for Pacific coast states and another for Atlantic Coast states.

Exponential growth of scientific and technical literature occurred during second half of the 20th century. In Fishery science also many new technological developments during this period enabled the publication of journals exclusively on the subject. Thus journals on subjects like fishery management, Aquaculture, Fish Pathology, Fish economics etc originated. This can be associated with the knowledge explosion or fragmentation in Fishery science.

As in other scientific research, journal literature forms the major communication system in Fishery science. Research in this area is important as it is international in scope and economically important to many coastal countries whose export earnings depend on fish and its products. Due to the growth and scatter of journal literature, information transfer in fishery science is to adopt new methods and techniques. Many such methods for measuring information have been introduced in library and information science. This helps in evaluation of the use of information. Citation studies are widely used for measures of information in journal literature. Informetric Analysis is currently applied in such citation studies. This enables proper selection of literature for planning information services. Eventhough citation studies in different science disciplines
were conducted, no study has been done so far in Fishery science.

1.1 Relevance of the Topic

Literature is in abundance, but the user do not know where and how to search for it. In this context the librarian or information scientist has a vital role to play in helping the researchers to select suitable literature for their work. But this role is not clearly understood by librarians or researchers even in developed countries. Most of the scientists depend on information retrieval services for getting journal literature needed for their work. These are usually costly and may be useful for a section of researchers. Librarian must know about evaluative methods which can be applied to assess the particular needs of researchers in their organisation.

Many libraries acquire books and journals without a definite procurement policy. This creates a problem in organizations where huge amounts are spent on research and libraries are expected to support research work. As the present trend is escalating cost of books and journals, low or steady library budget and increased demand, the librarians are faced with the problem of proper management of library collection. The acquisition and information services are to be planned in such a way that the materials are put to the maximum use. Otherwise a library spending
crores on its budget without proper 'use' is a real waste of funds. To avoid such wastage, scientific planning by evaluative studies is essential. Citation analysis is done by many evaluators in different fields especially science, engineering and mathematics to assess the value of journals [4, 5, 6, 7]. By the starting of 'Science Citation Index' by Institute of Scientific Information (USA), a practical means of conducting citation analysis was found. Even then plain citation counting was not fully accepted as a criteria for effective journal selection. This led to many studies which proposed use of 'Impact Factor' and 'Immediacy Index' as modified citation weights [8, 9]. It is based on the number of citations received by journal articles in a particular period for articles published in the journal over a certain period.

Application of informetric methods to evaluate scientific journals yields data which can be of help to librarians, information scientists and researchers. Role of journal in the advancement of research is revealed by this type of studies. The present study focuses on journals belonging to the subject Fishery science. Research in Fishery science is being sponsored by international, national and regional organizations.

Study of fishes is known as 'ichthyology'. Earlier ichthyological studies were concerned with biology and related topics. Fishing is considered as an age old
profession. Many ancient paintings and engravings indicating fishing were discovered in modern times. By the mechanisation of fishing methods, research on fisheries developed. Fish and its products control the economy of countries like India which has a vast area of coastline. Along with this, the literature on the topic also increased. Thus fishery science developed into a well established discipline which is considered equal to Agriculture. Administration of fisheries comes under Ministry of Agriculture in many countries and in some under Ministry of Agriculture and Fisheries. Increase in literature and increased research activities have made it impossible for any library to purchase all the relevant literature. This leaves no choice except a judicious selection policy for a library specialising in the topic. It is seen that research results are being published as scientific papers in journals, which explain new techniques or products. So researchers depend on this type of literature more than on books and other materials. Information dissemination which satisfies the clientele in a research library is possible only if adequate and relevant literature, published is made available. To select relevant literature, the application of scientific technique is essential. Citation studies is the only accepted method which enables meticulous selection of literature, now practiced all over the world.

Lack of citation analyses in Fishery science is a major hindrance which has to be tackled effectively for the
benefit of the end users. Fishery science as such is a diverse field which have inter-disciplinary link with subjects like Physics, Chemistry, Statistics, Economics etc. So the results based on fishery research may be coming out in a wide variety of subject journals. Therefore citation study of selected journals is an effective tool which can be used successfully in any library attached to an organization specializing in fishery science research.

1.2 The Topic

The title of the topic studied is "Journal productivity in Fishery science: An informetric analysis". The keywords in the title are explained as follows for the purpose of this study.

Journal Productivity

Journals are publications issued at regular intervals such as weekly, monthly or quarterly. Journals are published on professional, technical, trade and agricultural topics and are issued by commercial publishers or sponsored by an organisation. Journal productivity is based on distribution pattern of citations in different journals during the period of study and the ranking of journals according to the decreasing number of citations received. Productivity is a measure of any commodity produced. In the present study journal productivity means a measure of journals produced using informetric methods.
Fishery science

Fishery science is a fast developing area which concerns with study of fishes. In the present context it relates to all exploited aquatic animal resources of commercial importance to man. Fishery science has two different meanings. First it is a body of scientific knowledge pertaining to the fisheries and their environment. It is also called Fisheries science, Fishery biology or just Fisheries. Second, it is a profession that expands and uses the body of scientific fishery knowledge to obtain optimum benefits for society from the living resources of the waters. In this sense, it includes research of many kinds and application to problems of the fisheries and aquatic environment [10]. The scope of the term Fishery science is limited for the purpose of this study as given above.

Informetrics

Informetrics is the "use and development of a variety of measures to study and analyse several properties of information in general and documents in particular" [11]. It covers all quantitative studies on information science including bibliometrics and scientometrics.

1.3 Scope

The scope of the study is to evaluate the journals in Fishery science based on the citations received by them. The
year of study is taken as 1993 as it is the nearest possible year of starting this research in which all issues of sample journals were available. The geographical area to which the journals belong is not restricted as the subject is an internationally developing one. If journals in one area is only taken, the results may be biased. Moreover in fisheries libraries the need is the judicious selection of internationally important journals which are costly. The cost is increasing due to depreciation in value of rupee and the enhancement of price by publishers every year. Journal citations are the variable taken for study as they represent the use made by those citing them.

Limitations

There are some limitations to this study which are taken into account for in the design of the study. Selecting the primary journals for the study is difficult as there are numerous journals and the selection may not represent all areas of specialisation of the subject. To overcome this limitation, the number of occurrence of leading journals in a secondary service is considered to select the samples for the study. Another limitation is the format of the citation. Journal abbreviations were given in different forms by various authors. So after completing the entries, corrections had to be made for preparing a uniform index of cited journals. In some journals like 'Journals of Fish
Biology', the full title is given in citations which is a good practice. Change of title was also another limitation. In such cases same journal came in two places in the index and total of the two were taken as number of citations received by the journal. (Eg. Journal du Conseil changed to ICES Journal of Marine Science). To determine subject of article, some dealt with more than one area so that articles have to be grouped under more than one subject. Name of individual authors were not taken in study of productivity as it may not be accurate as only 5 sample journals were studied and some of the authors may have papers published in other journals also in the same year.

1.4 **Objectives**

The major objective of the study are:

a) to identify and prepare a comprehensive list of journals in Fishery science.

b) to assess the development of Fishery science in terms of journal articles.

c) to study journal citation pattern and author production using bibliometric laws.

d) to study distribution of types of citations.

e) to study whether journal citations conform to 80/20 rule.

f) to study obsolescence or aging of journals.

g) to study geographical distribution of cited journals.
1.5 Other Dimensions

This study concentrates on certain selected journals of Fishery science. Earlier studies showed that to get a higher accuracy in result, there should be a certain amount of increase in the number of samples selected. As the number of journals in Fishery science is increasing with the enhanced output of research, it is impossible to study citation of all journals. Therefore a selection of samples became inevitable. Moreover, Fishery science also incorporates the methods used in other scientific fields and it is expanding in different directions and consequently in the output of published materials. Some of the earlier research findings are becoming obsolete now. Greater emphasis is laid on studies on the application of aquaculture, physiology, ecology, economics, pathology, etc. The present study throws light on the main fields of fishery research as well as the important primary sources through which the results are being published. It reveals the trend of authorship and journal publication. The study will be of great help in formulating an acquisition policy of journals for library collection development. It gives a guide-line to plan the information service giving priority to those titles with top ranks. The study can be conducted at intervals, say about 10 years so that the list may be revised including newly published journals. The present work can be used as the basis for identifying less used or obsolete journals. Another important dimension of the study is to identify the
major areas of research in Fishery science and their current trends.

1.6 Hypotheses

The following hypotheses were formulated and tested in the course of the study.

a) The number of journals in Fishery science shows an increase.

b) The number of articles, published also shows an increase.

c) The pattern of citation received by journals is according to bibliometric laws. Number of authors producing articles also conform to bibliometric laws.

d) The citations of journal articles are more in number than other types of publications.

e) The percentage of articles receiving more citations in the subject conform to 80/20 rule.

f) Journals become obsolete quickly in this field.

g) Most journals are published from developed countries.

1.7 Methodology

Collecting, organizing and analysing data were done on the basis of established informetric methods. Sample of 5 journals was selected first and from these the data needed for the study were recorded in computer using CDS/ISIS programme. The data was sorted to prepare tables and figures which formed the basis for analyses. The analyses were done
to test the validity of hypotheses based on objectives. Various informetric distributions like Lotka's, Bradford's, Bookstein's, Gompertz's and Leimkuhler's were used in analysing the data.

1.8 Layout of the Thesis

After completing the analyses and formulating results of the study, the format of the thesis was determined. The thesis is divided into different chapters mentioned below.

CHAPTER 1 - INTRODUCTION

This gives an overview on the topic of research. Introduction gives the relevance of topic, define the problem, objectives of the study, hypothesis, methods of data collection, analysis and layout of the thesis.

CHAPTER 2 - FISHERY SCIENCE - STUDY OF ITS STRUCTURE AND DEVELOPMENT

This chapter provides a detailed account of the subject Fishery science and its development. A comprehensive outline is given along with definition, scope, classification, development and sources of information.

CHAPTER 3 - INFORMETRIC ANALYSIS

Method of study used in this research and its literature review form the content of this chapter. Genesis and development, literature review, informetric laws, applications of
informetric methods in citation analyses and recent trends in the subject are explained in detail. The literature review covers almost all important aspects of the topic from origin upto the period of this study.

CHAPTER 4 - DATA COLLECTION AND ORGANIZATION

Details of the method adopted for collecting samples for the study, data collection and organization of the data are given. The methods are based on availability of data, period and objectives of the research undertaken.

CHAPTER 5 - ANALYSES OF DATA

The description, analyses and the results of the study are covered in this chapter. The figures and tables which form part of the interpretation of data are also included in this chapter.

CHAPTER 6 - FINDINGS AND CONCLUSIONS

The culmination of the study results in the formulation of certain findings and the conclusions drawn are explained in this chapter. Suggestions for further study and areas of application of the study are also identified.

The last part of the thesis consists of a bibliography listing 513 documents including the literature related to the topic of research.
References:


7. Garfield, E. 1988. Science Citation Index, Journal Citation Reports 1987, a bibliometric analysis of science journals in the ISI database, ISI press, Philadelphia.

