CHAPTER- 1

GENERAL INTRODUCTION

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Chapter- 1

GENERAL INTRODUCTION

1.0 INTRODUCTION

The key element of success and failure of a nation largely depends on the application of scientific methods to fulfill its necessity. Generation of highly trained scientific manpower is very important as they are capable of making scientific and technological advancement and therefore contributing immensely to the socio-economic development of the nation. The word "Science" has its origin from the Latin word “Scientia”, ‘Knowledge’. The simple meaning of science is "it refers to a system to acquire this knowledge is based on the scientific method". Further this organized body of knowledge gains momentum through research. The enormous growth in the area of Science & Technology has brought certain countries much ahead of other countries. There has been tremendous development in the field of science and of late science has become an interdisciplinary in its application. Scientists are the knowledge seekers, always searching out answer of how and why things happen?

Information is the vital resource for any research and development activities in the field of knowledge. Proper and adequate information is essential for scientific and economic advancement of a nation. A scientist needs information for satisfying his/her desires for which he/she has to seek appropriate information. A scientist in the broadest sense refers to any person who is engaged in a systematic activity to acquire knowledge or an individual that is engaged in such practices and tradition that are linked to schools of thoughts or philosophy. In a more restricted sense, scientists refer to the individuals who use the scientific method for acquiring information and organize, analyze and implement the same in the area of his research or subject. The Scientist generally employs their ideas with the aid of current and retrospective information. Sometimes they apply both the channels of knowledge. They are generally search documents like

text books, periodicals, references, conferences/ seminars proceedings, patents, standards, reviews, newsletters, index, abstract, bibliographies, micrographics, research reports, theses/ dissertations, etc. Information needs of scientist are equally based on the knowledge about those sources of information and accessibility of this information sources. Scientists significantly depend on the communication with fellow scientists/ specialists so as to keep themselves abreast with current development in the respective subject/research. Research scholars almost always rely on the work of others scientists working in the same field. Further, scientists are not only actively involved in research but also frequently search for information pertaining to the latest trends and developments in the subject including the area of research which facilitates with up-to-date professional information. They also acquaint themselves with new innovations in their fields. Thus, information helps the scientists to get well informed with the current developments in their subjects and respective areas of research.

Presently Scientists, engineers and technologists are getting their desired information easily within a short possible time with the help of computer and telecommunication facilities. With the introduction of Information and Communication Technology (ICT), it is visualized that there have been some changes that have taken place with respect to information needs of Scientists and technologists. Presently Internet is the basic path for getting electronic sources of information which fulfill the desires of the scientific community. Scientists working at scientific institutions are generally access Internet on regular basis. Through Internet they are searching the materials like e-book, e- journal, e-patent, e-report, e-proceedings, e-databases, etc. Electronic information services are obviously upcoming and enduring among all the executives irrespective of their disciplines and work environment. The On-line Access Services and the Internet services are the two popular library services in electronics formats. The scientists are now quite influenced by electronic information. Therefore, the scientists must be well equipped with modern technology so that the information, which is generated inside and outside the nation must be collected, organized and data warehouse can be developed which may help one in the institution to recycle the information. The scientists of the CSIR laboratories/ institutions in India are engaged in many R & D activities which are as confidential as important for the development of our nation. Therefore it is essential to find out the information needs of the scientists engaged in various fields of research, mainly the scientists working at CSIR

laboratories. To find out the research output of the CSIR laboratories it is important to analyze the publication trend of the scientists working in the different areas of research.

1.0.1 The History of Science

The history of science can be divided broadly into two main periods. One is the active Greek period from about 600 B.C. to about A.D. 200. The other is the active modern period from about 1400 onwards in the full flood of which we line. Science in a broad sense existed before the modern era and in many historical civilizations. Modern science is distinct in its approach and successful in its results, so it now defines what science is in the strictest sense of the term. Science in its original sense was a word for a type of knowledge rather than a specialized word for the pursuit of such knowledge. In particular, it was the type of knowledge which people can communicate to each other and share. For example, knowledge about the working of natural things was gathered long before recorded history and led to the development of complex abstract thought. This is shown by the construction of complex calendars, techniques for making poisonous plants edible, and buildings such as the Pyramids. However, no consistent conscientious distinction was made between knowledge of such things, which are true in every community, and other types of communal knowledge, such as mythologies and legal systems (http://en.wikipedia.org/wiki/Science, 2008).

They are again divided into following periods:

- The Ancient Science;
- Mediaeval Science;
- The Renaissance and early Modern Science; and
- Determinism and Post Determinism.

1.0.2 Science and Technology System of India

Science & Technology (S&T) has always been an integral part of the Indian culture. The contributions made by the scholar-scientists Aryabhatta, Bhaskara, Brahmagupta, Dhanvantari and Nagarjuna, in the fields of mathematics, astronomy, medicine and chemistry respectively during the prehistoric period are legendary and invaluable not

only to Indian S&T but also to the knowledge base of the humanity at large. During the last century the most well known Indian scientists were Srinivasa Ramanujan, J.C. Bose, P.C. Ray, Meghnad Saha, C.V. Raman, S.N. Bose, Birbal Sahni, P.C. Mahalanobis and M. Visvesvaraya. They have left indelible imprints on the world S&T scene. After independence the India's first Prime Minister Pandit Jawaharlal Nehru gave importance for the promotion of Science and Technology in the country. As a result, many new S&T departments and laboratories were established and the scientific research started in organized manner. Jawaharlal Nehru firmly believed that Science and Technology could be the twin tools that would help bring about social equity and economic development to enable India to join the mainstream of the world community. This conviction was reflected in the Scientific Policy Resolution (SPR) of 1958 that aims to foster, promote and sustain the cultivation of sciences and scientific research in the country and to secure for the people all the benefits that can accrue from the acquisition and application of scientific knowledge.

(Source: www. Gooogle.co.in)

Figure 1.1: Science and Technology System in India

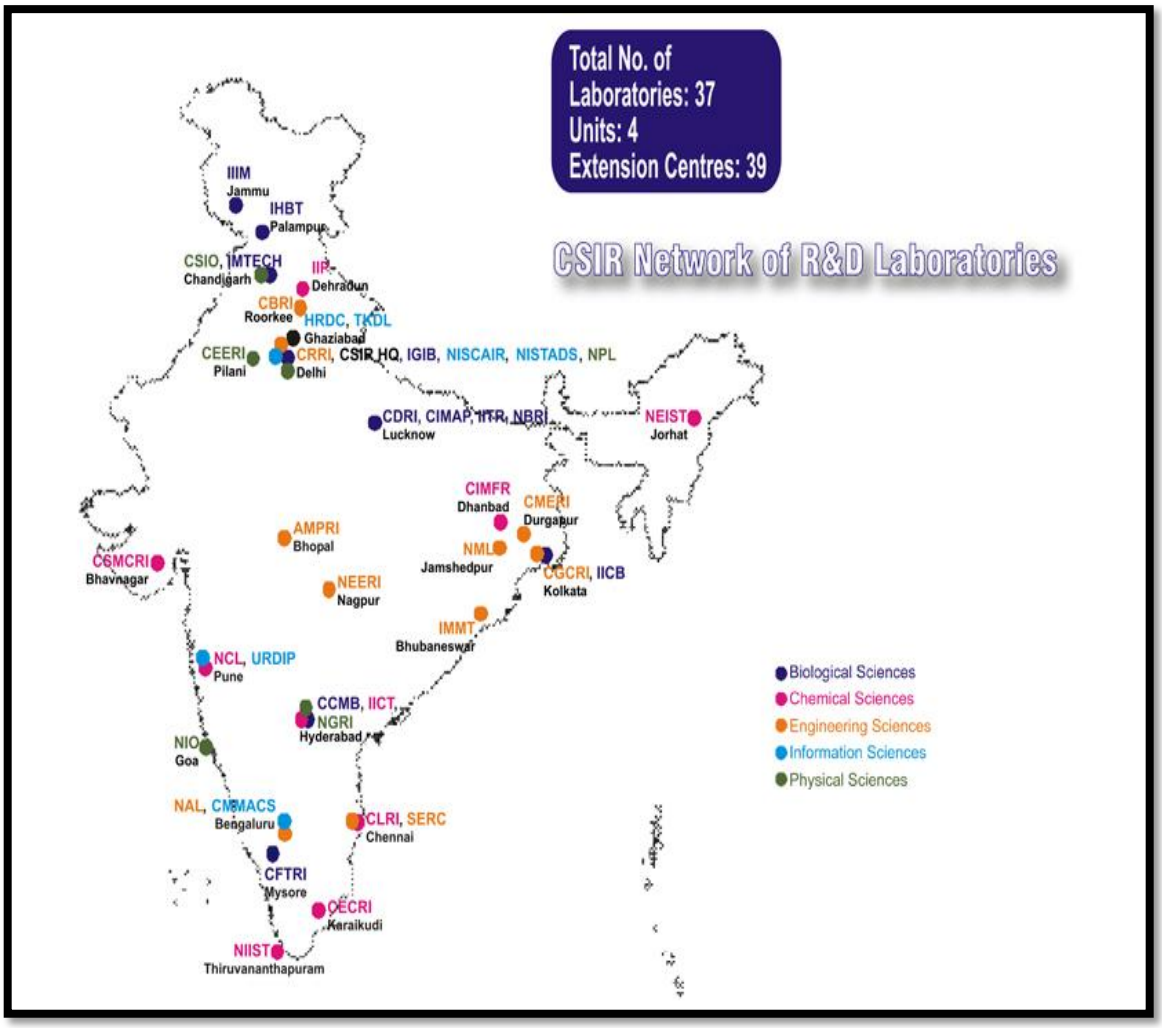
Several scientific departments were established in India with some specific objectives. The departments of Atomic Energy, Science and Technology, and Space were thus among the first S&T departments in the country. The S&T departments

functioning under the auspices of Central Government are: Department of Science and Technology (DST), Department of Scientific & Industrial Research (DSIR), Department of Atomic Energy (DAE), Department of Space (DoS), Department of Biotechnology (DBT) and Department of Ocean Development (DOD).

The Council of Scientific and Industrial Research (CSIR) was established in the year 1942 on 26th September. It is an autonomous body with its 39 institutes with around 100 field stations dedicated to research and development in well-defined areas and, is the major organization under DSIR. Today CSIR has been recognised as one of the largest publicly funded R&D organisations in the world having linkages with the academia, R&D organisations and industry. CSIR's R&D portfolio embraces areas as diverse as Aerospace, Biotechnology, Chemicals, etc. Over more than two decades now, CSIR has been annually benchmarking its research output using scientometric techniques and comparing itself with other leading Research Institutions in the country. However, this has been done by aggregating the impact of all its papers using the impact factor of the journals in which the papers appear. As a policy decision of Govt. of India, all CSIR laboratories in India have re-named their Library and Documentation Divisions as Knowledge Resource Center (KRC) in the year 2008.

The present study basically aims to find out the information need and use pattern by scientists working at selected CSIR laboratories of Northeast and Eastern India by using user study and also employing bibliometrics study of their research publications in the areas of selected subjects covered under those CSIR Laboratories.

The **Map- 1.1** shows the location of network of 37 numbers of CSIR Laboratories, 4 Units and 39 Extension Centres. The present study has taken seven CSIR R & D Laboratories located in Northeast and Eastern India.



Source: http://www.google.co.in/search?q (Accessed on 15-09-2016)

Map- 1.1: CSIR Network of R & D Laboratories

1.0.3 Special Library

All Libraries are special, but some are more special than others - J. Leide

The concepts of "Special Libraries" have emerged in the United Kingdom and the United States in the nineteenth century. Over the years, many definitions of special libraries have emerged. Some of them are, according to a publication of Special Library Association (SLA), the special libraries are the information organizations sponsored by private companies, government agencies, not-for-profit organizations, or professional associations.

A special library is a library that provides specialized information resources on a particular subject, serves a specialized and limited clientele, and delivers specialized services to that clientele. These libraries are called as special libraries because they are attached with the special institutions like scientific, government, corporate, law, medical, some special academic institutions/ universities and they serve a targeted group of users.

Special libraries often have a more specific clientele than other libraries and deals with more specialized kind of information. They are developed to support the mission of their parent organization and their collection and services are more targeted and specific to the needs of their clientele. Special libraries may or may not be open to the general public. Special libraries are "Special" in terms of their collections, users and services. A research institute's library may supply information to scientists who lack the time to visit the library (http:// en.m.wikipedia.org/wiki/special library, 2016).

The present study has been deals with the information use pattern of the tern scientists of CSIR Laboratories of Northeast and Eastern India. The Libraries of the CSIR Laboratories are known as Knowledge Resource Centre (KRC). The KRC's are categorized under the Special libraries as they have served the special kind of users like Scientists. The main services of the KRC's are Current Awareness Service, Selective Dissemination of Information Service, Documentation Service, Newspaper Clippings, New Arrivals, OPAC and Web OPAC service, Inter Library Loan service, Translation Service, etc.

1.1 STATEMENT OF THE PROBLEM

Information use has become pragmatic among the scientists for research and development. The scientists engaged in research require versatile information pertaining to research and solely depend upon the libraries/information centers. Therefore taking the necessity of information of the scientists, the library accumulate information from wide range of sources from printed as well as E- resources like, consortium, open access databases and repackages the same into the subject of interest and provide to the scientists. The study focuses on the information use pattern by scientists working at selected CSIR Laboratories of Northeast and Eastern India.

Scientists are those people who engage in a systematic activity to acquire knowledge or to generate and make use of the latest information. The scientists are the key components of the growth and development of a nation. The progress of the nation largely depends on the research and development activities. Hence, it is imperative to find out the information required for the scientists. In this scenario, R&D libraries need to provide the required information to them so as to accelerate their works and complete in stipulated time. The problem associated with the libraries whether they are providing the right information to the scientists. It is further added with the problem whether the scientists are facilitated with the subject gateways in their field of research. Hence, it becomes essential to find out the information need of the scientists concerning to the current advancement in their field and to keep them up-dated.

Information need and use pattern are the important path to understand the information requirement of the scientists in the library. It is often found that Scientists of a research institutions were not much aware about the available library resources, different services, and they were unaware about the handling the resources available in the library due to their busy schedule. In the present Information and Communication Technology era, the libraries and information centers are adopted many technologies to make their library practices up to date and more users friendly. Some of the technologies and practices introduced in the libraries are RFID Technology; Electronic-Resource Consortium, Digital Library, Digitization, Institutional Repository, Open source software's and introducing Library automation software, etc. It is very much important for the special library users to make them aware about the technologies and modern practices exercised by their library so that they can get right information at a least possible time for gaining knowledge for their research activities. Besides these, the factor associated with information use pattern by scientists receives much importance in LIS research because the libraries are responsible to provide their required information within their available limited budgetary resources. All these aspects promoted the research scholar to take this research topic.

1.2 OBJECTIVES OF THE STUDY

The following are the objectives:

- To determine the information use patterns of the scientists of CSIR laboratories of Northeast and Eastern India;
- To study the trend of information use by the scientists of individual laboratories on the basis of their publications and citations given by them in journals;
- To know the purpose of use of information, nature and type of information required by the scientists;
- To investigate the various channels;
- To find out the extent of Internet, E-resources use by the scientists;
- To identify the type of documents mostly used; and
- To ascertain the extent of current information needs and their uses by the scientists.

1.3 HYPOTHESES OF THE STUDY

There are following hypotheses:

1.3.1 Null Hypothesis= **H01**: The adequate library resources may not be available in CSIR KRC for the scientists.

Alternative Hypothesis**=** **H11**: The adequate library resources are available in CSIR KRC for the scientists.

1.3.2 Null Hypothesis= **H02**: The research output may not be declined on account of limited library budget.

Alternative Hypothesis= **H12**: The research output may be declined on account of limited library budget.

1.3.3 Null Hypothesis= **H03**: The scientists may not be comfortable using E-resources.

Alternative Hypothesis= **H13**: The scientists are feeling comfortable while using E-resources.

1.4 SIGNIFICANCE OF THE STUDY

The library happens to be the nucleus of information center which supports the learning, teaching and research needs of the scientists by providing access to scholarly resources. Growth and changes have always been predominant characteristics of library. These characteristics give rise to the development of collections and services within the library system. The library should be adapting as it responds both to changes to cater the needs of the scientists and to change within the field of information technology. Therefore collection of information must remain flexible enough to support the causes of the information requirements of the scientists in a changing technological scenario. Now-a-days, due to adaptation of information and communication technologies, the libraries are dependent upon the digital materials which are acquired through Internet on a platform like Electronic Consortium.

The significance of the present study lies with the fact that, it aims at evaluating the flexibility of the libraries in developing a process to integrate the changes into standard library practice to meet the current and future information needs of the scientists, research associates, and research fellows.

1.5 SCOPE OF THE STUDY

In Northeast India there is only one CSIR laboratory that is North East Institute of Science and Technology (NEIST), Jorhat. This laboratory comprises of five major disciplines such as, Chemical Science, Biological Science, Engineering Science, Material Science and Geo Science. In Eastern India there are six laboratories namely Central Glass and Ceramic Research Institute (CGCRI), Kolkata; Indian Institute of Chemical Biology (IICB), Kolkata; Institute of Minerals and Materials Technology (IMMT), Bhubaneswar; Central Mechanical Engineering Research Institute (CMERI), Durgapur; National Metallurgical Laboratory (NML), Jamshedpur and Central Institute of Mining and Fuel Research (CIMFR), Dhanbad. Observing the practical difficulties it may be conspicuous that certain laboratory may not co-operate actively, in such juncture the available data has been used as a primary resource to reach final findings. Out of these seven laboratories the present study has been confined itself to selected laboratories and approximately 350 scientists and researchers. It is very difficult to

cover all the scientists as they are very busy in their research activities and they have no time to responds properly. Also many scientists were visited inside and outside the country as visiting professor, attending conferences, meetings and visited laboratories for their research work, projects. Hence, the work deals extensively about the information use pattern by the scientists of the selected laboratories with 350 scientists. Bibliometric study has been also being done on the basis of citations given by the scientists in their papers indexed in SCOPUS database. Further attempt have been made to dig cluster of information with the help of SCOPUS database where facilities for this is available.

But, the present study has been delimited to the selected CSIR laboratories of Northeast and Eastern India and no other research and development institutes in the concerned disciplines have been taken into account.

1.6 DEFINITION OF OPERATIONAL TERMS/ KEY WORDS

1.6.1 Information: The concept

'Information' is the key component for any research and development activities. The term 'Information', therefore, denotes various meanings. Dictionaries define information as an action of telling or fact which is something new intelligence or knowledge. The term is used as a noun. The Oxford English Dictionary defines '**Information**' as the action of informing; formation or component of the mind or character, training, instruction, teaching; communication of edifying knowledge. Information, according to Random House Dictionary for the English Language means knowledge communicated or received concerning a particular fact or circumstances. By information, Webster's Third New International Dictionary for the English Language means that it is a communication or reception of knowledge or intelligence. It is a knowledge communicated by others or obtained through investigation, study or instruction. Information thus can be defined as a concept, statement, and idea or an association of concepts, statements, and ideas. Further, it also can be well defined as a message conveyed or intended to be conveyed by a systematized body of ideas, or it is accepted or acceptable substitutes.

1.6.2 Information Need

The term 'Information need' has become an umbrella under which a variety of interpretations falls. Need is want of something, which one cannot well do without. It can be said that information need is a condition in which certain information contributes to achievement of genuine purpose. It is a generic term which means requirement, want, desires and demand.

Need is a subjective experience which occurs only in the mind of the person and consequently, is not directly accessible to an observer. The general concept of need is, of course, a psychological concept, since it refers to a mental state or states and a good deal attention has been given to the idea, its subjective character and the motivation for the expression of need or the physiological drives that result in the expression of need.

1.6.3 Information Seeking Behaviour

In order to satisfy the information needs, the user actively undergoes the information seeking process. Information seeking behavior is the application of attitudes through set of actions in order to achieve desired information need. The information seeking behavior essentially refers to the strategies and actions undertaken to locate discrete knowledge elements.

1.6.4 Information Use Pattern

User studies, use studies, information need studies, user research, use pattern, seeking behavior etc. are closely related to each other and often not precisely differentiated. All these studies are come under the umbrella of 'User study'. The user study is the study of information processing activities of users. From the last several years user studies, pattern of using information by the users and feeling about the electronic and print resources in the library are becoming the important topic of research in the field of library and information science. Many of the research studies mainly focused on how people use resources.

To create information and to promote use of information, it is necessary to know the needs of users. Research and development institution, are the place where knowledge is being generated as a result of research activities undertaken by them. Creating and using scientific knowledge are imperative components of the activities of

scientists. According to an estimate, a working scientist spends one third of his time in searching for information and the cost of this search represents one fifth of all the money allocated to science. The effective utilization of the information generated in the field of science and technology due to R&D efforts has been recognized as essential for the socio-economic development and technological progress. The most important factor influencing the scientists is the type of work in which he is engaged. The use of information begins when information sought or received from various sources are processed by the information seekers. Information use pattern is a path selected by the individuals in order to resolve a need.

1.6.5 Science

The success and failure of a nation depends to the extent science is applied to its needs. To state the genealogy of science, it is derived from the Latin word Scientia. The word scientia means nothing more definite than **"knowledge"** but the modern usage covers only certain kinds of knowledge. The area of science is so extensive that no men can have a group of more than a minute of fraction of them. Science extends from sub atomic reaction to mental processes, from mathematical laws of thermo-dynamics to the economics race relations, from the births and deaths of stars to the migration of birds; from the study of ultramicroscopic viruses to that of extragalactic nabulac; from the rise and desolation of cultures and crystals to the rise and dissolution of atoms and of universe. Science is search for judgments to which universal and may be obtained. It is a search that never ends and is never satisfied. The acceptance of our usage of scientific follows closely the growing pressing of what has come to be called **"Science"**, earlier it was known as natural philosophy. Science has thus become constantly more nearly equated with **"Research"** and has come to connote a process and not a static body of doctrine.

According to Wikipedia (http://en.wikipedia.org/wiki/Science, 2016), Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. According to the New Encyclopedia Britannica (1998; vol.10; pp.552), science is related with any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation.

1.6.6 Bibliometric Studies

The exponential growth of literature and rapid development of libraries led to generate several evolutionary studies, identification and application of appropriate quantitative measuring techniques which called Bibliometrics. The application of quantitative techniques like counting, measuring, comparing qualities, analyzing measurements: qualitative analysis is perhaps the main tool of Science. Scientific research itself and recording and communicating results through publication have become enormous and complex. It is so complex and specialized that personal knowledge and experience are no longer sufficient tools for understanding trends of research output. Bibliometrics (sometimes called Scientometrics) is the main tool for quantitative analysis of the scientific literature. There are various definitions used for "bibliometrics." Essentially, bibliometrics is the application of quantitative analysis and statistics of publications such as journal articles and their accompanying citation counts.

Quantitative evaluation of publication and citation data is now used in almost all nations around the globe with a sizeable science enterprise. Bibliometrics is used in research performance evaluation, especially in university and government labs, and also by policymakers, research directors and administrators, information specialists and librarians, and researchers themselves. Pritchard (1969) used the term "bibliometrics" to describe all studies which quantify the process of written communication. Brookes (1990) in his address at the 2nd International conference on Informetrics held in Canada said that "had I known of Ranganathan's term in time, I would have adopted "librametry" for information studies and "bibliometrics for Information Science. But it was too late; librarians liked bibliometrics." The scientific community takes the support of bibliometric data, including citation counts of articles, impact factor of journals, print and electronic mode etc. in their subject areas for selecting the preferred journals for research paper /scholarly communication. Similarly, the research publication date and citation year also contribute to the citation pattern of a scholarly communication and these are needed to be studied in details to understand the research productivity of a scientific organization.

1.6. 6.1 Scientometrics

The term Scientometrics was first introduced and came into prominence with the publication of the journal named "Scientometric" by T. Braunin (1977), originally

published from Hungary. Scientometrics is the part of sociology of science and have applied in science policy making. Scientometric includes studies pertaining to scattering of articles over journals, growth of literature, obsolescence of documents, circulation studies, author productivity, impact of research, distribution of publications by country, by language, by institutions, disciplines, type of documents, etc.

1.6.6.2 Informetrics

According to Brookes the term 'Informetrics' was first introduced by Otto Nacke of West Germany in 1976. According to Brookes the word 'Informetrics' is a new term in being used to cover both Sciento and Biblio-metrics impartially. Hence, informetrics is the study of the quantitative aspects of information in any form, not just records or bibliographies and in any social group not just scientists. In simple words it is the quantitative measurement of information.

1.6.6.3 Citation Analysis

Citation Analysis is the examination of the frequency, patterns, and graphs of citations in articles and books. It uses citations in scholarly works to establish links to other works or other researchers. It is one of the most widely used methods of Biblometrics.

1.6.7 CSIR Laboratories of Northeast and Eastern India

The Northeast India is a true frontier region. It has over 2000 km of border with Bhutan, China, Myanmar and Bangladesh and is connected to the rest of India by a narrow 20 km wide corridor of land. One of the most ethnically and linguistically diverse regions in Asia, each state has its distinct culture and traditions. From times immemorial, India's Northeast has been the meeting point of various communities, faiths and cultures. A place renowned for its magical beauty and bewildering diversity, Northeast India is the home for more than 166 separate tribes speaking a wide range of languages. Northeast India comprises of eight states. They are Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. In this region of Traveler's Paradise, there is only one CSIR laboratory which is presently known as North East Institute of Science and Technology (NEIST), Jorhat with its two branches at Naharlagun, in Arunachal Pradesh and Imphal in Manipur. The major thrust of

Research and Development (R&D) activities of NEIST has been to develop indigenous technologies and knowledge by utilizing immense natural wealth of the Northeastern Regions of India.

Eastern India is the region of India lying in the east corridor of our nation consisting of the Indian states of West Bengal, Bihar, Jharkhand, Odisha and also the union territory Andaman and Nicobar Islands. In this region there are six CSIR laboratories namely Central Glass and Ceramic Research Institute (CGCRI), Kolkata (West Bengal); Indian Institute of Chemical Biology (IICB), Kolkata (West Bengal); Institute of Minerals and Materials Technology (IMMT), Bhubaneswar (Odisha); Central Mechanical Engineering Research Institute (CMERI), Durgapur (West Bengal); National Metallurgical Laboratory (NML), Jamshedpur (Jharkhand) and Central Institute of Mining and Fuel Research (CIMFR), Dhanbad (Jharkhand). The present study is mainly deals with the CSIR-NEIST of North East India and also some selected laboratories of Eastern India.

1.6.8 Knowledge Resource Centre (KRC)

Traditionally libraries have always been considered as store house of information. But libraries of today are not only the store house of knowledge which representing and providing valuable guidance to convert the same in to useful knowledge for the benefit of mankind. With the evolution of Information and Communication Technology, the libraries have transformed into Knowledge centers. Libraries can support networking of knowledge and people to the maximum extent if the desired content and the requirements of users are available with them in machine readable form. The CSIR laboratories are the treasure of science and technology system of India and to support their R & D work and wide perspectives of the global importance, CSIR ensures best use of resources of knowledge available with CSIR. The information and knowledge combined with technology not only helps in matching user's needs with knowledge resources, but also helps in taking decisions in the wide perspectives of global importance.

To combine the information and knowledge with technology CSIR renamed the libraries of all the laboratories as Knowledge Resource Centre (KRC) in 2008. It aims to providing information support to the scientific/technical staff of the CSIR laboratories

using both archival and contemporary digital resources for libraries. (http://www.csir.res.in/Home.aspx?MenuId=6, Accessed on 20-01-2017).

1.6.9 National Knowledge Resource Consortium (NKRC)

To strengthen the research and development system of India CSIR set up the CSIR Electronic Journals Consortium in the year 2001. It was provided access to 1200 odd journals of Elsevier Science to all its users. Over a period of time, the number of resources of the consortium was grown and the number of users was also increased. In the year 2009, the Consortium of CSIR was newly formed as National Knowledge Resource Consortium (NKRC) which covers libraries and information centers of 43 CSIR and 26 DST institutes.

Presently the NKRC facilitates access to 5,000+ e-journals of all major publishers, patents, standards, citation and bibliographic databases. Apart from licensed resources, NKRC is also a single point entity that provides its users with access to a multitude of open access resources. (http://nkrc.niscair.res.in/, Accessed on 27-01-2017)

1.7 PLAN AND ORGANIZATION OF CHAPTERS

The present study has been planned and organized into eight broad chapters. A summary of each chapter has been given below:

Chapter 1: General Introduction

The first Chapter of the study was deals with the general introduction of the study, Statement of the Problem, Scope of the Study, Objectives of the study, Hypotheses identified during the study, Significance of the study, brief description of the important key terms and plan and organization of the thesis.

Chapter 2: Review of Literature

This Chapter gives a brief review of related literature. The review has been done as studies conducted international level, conducted in India and studies conducted in Northeast India which have been arranged in a chronological order and alphabetical sequence.

Chapter 3: Research Methodology and Research Design

The Chapter 3 was mainly deals with the research methodology and research design of the present study. The chapter was consists of introductory part, concept of research, definition, research methods and design of the study, methodology used, area covered under the study, sampling, questionnaire method, observation method, bibliometric analysis and data analysis method.

Chapter 4: Information Needs and Information Use Pattern by Scientists: A Conceptual Framework

The chapter 4 presents the conceptual Framework of the study which includes introduction part, meaning of Information, information needs, concept of user studies, users approach to information, information use pattern, information needs of the scientists, scientists approach to information, information seeking behavior of scientists, use of formal and informal channels and recent trends.

Chapter 5: Brief Profile of CSIR laboratories of Northeast and Eastern India and their Knowledge Resource Centers: A Theoretical Perspective

This Chapter deals with the introduction, establishment of Council of Scientific and industrial research (CSIR), list of CSIR laboratories, CSIR laboratories of Northeast and Eastern India, brief description about CSIR-North East Institute of Science Technology (NEIST), Jorhat and its Knowledge Resource Center; CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar and its KRC; CSIR- Indian Institute of Chemical Biology (IICB) and its KRC; CSIR Central Glass and Ceramic Research Institute (CGCRI), Kolkata and its KRC; CSIR- Central Institute of Mineral and Fuel Research (CIMFR), Dhanbad and its KRC; CSIR- National Metallurgical Laboratory (NML), Jamshedpur and its KRC and CSIR- Central Mechanical Engineering Research Institute, Durgapur and its KRC.

Chapter 6: Data Analysis and Interpretations

The Chapter 6 deals with the analysis and interpretation of the data collected from Librarian's, users' study of surveyed CSIR laboratories and bibliometric analysis of the research output of the scientists. The user's feedback has been discussed under the different heads like total number of responds, category wise distribution of the responds scientist's frequency of visit to the library, time devoted to the library, purpose of

visiting the library, type of information need, have departmental library, type of document search, accessing internet, reasons for accessing internet, duration of access the internet, use of search engines to access e-resources, frequency of using electronic resources and other resources in the institute library, purpose of use of electronic resources, use of consortium, purpose of using consortium, satisfaction with regards to the library services, difficulties faced by the scientists while using library, suggestions, etc. The bibliometric analysis of the research publications are mainly consists of year wise distribution of publication, subject wise distribution, source wise distribution, country wise distribution, document type wise distribution, distribution of publication by affiliation, most productive author, cited author and h-index of the author of each laboratories. The analyses of the data collected from the librarian are mainly deals with the general information about the individual laboratories, their collections, budget, services, activities, facilities, electronic resources, etc.

Chapter 7: Important Findings and Suggestions

The Chapter 7 is the outcome of the present study which mainly describes about the major findings of the study including suggestions and recommendations.

Chapter 8: Conclusion

The present study was concluded here with a hope for further development in the use of latest technologies in the Knowledge Research Center's (KRC) of the CSIR laboratories for the benefit of the scientific communities.

References

The references have been prepared based on the APA (American Psychological Association) citation style in alphabetical order.

Appendices

The last part of the Thesis is Appendices which consists of covering letters, two types of questionnaires and the publications of the research scholar which are as follows:

I. Covering Letter 1: It has been sent to the authority of the laboratories under study to get permission for distributing and collecting questionnaires among the Scientists and Librarian or Head of the KRC.

II. Covering Letter 2: This letter contains request for permission from the scientists and librarian or head of the KRC of the respective institute to provide information asked in the questionnaires.

III. Questionnaire 1: This questionnaire has been distributed to the librarian or head of the KRC of each institute/ laboratory under study.

IV. Questionnaire 2: This questionnaire has been distributed to the scientists/ research scholars of each institute/ laboratory under study.

V. Publications: This part of the thesis consists of the papers that have been published on related study.

1.7 CONCLUSION

The identification of information needs and information use pattern of the CSIR scientists was the main research area of the present study. The present chapter mainly discusses the introduction of the study, history of science and science and technology system of India, about special library, Objective of the study, and hypotheses of the study, statement of the problem, significance of the study, scope of the study, important key terms and brief descriptions of the Chapters. For further study, the research scholar had gone through various related literature and also done review of those literatures which have discussed in the **Chapter- 2**.