INFORMATION NEEDS AND USE PATTERN

A STUDY WITH SPECIAL REFERENCE TO THE SCIENTISTS IN THE RUBBER RESEARCH INSTITUTE OF INDIA

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DISSERTATION

SUBMITTED TO THE UNIVERSITY OF KERALA

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF LIBRARY AND INFORMATION SCIENCE

1987-88

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

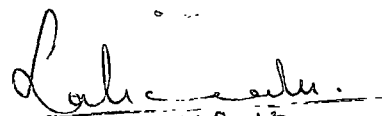UNIVERSITY OF KERALA

TRIVANDRUM.

1989.

CERTIFICATE

This is to certify that the dissertation entitled 'Information Needs and Use Pattern: A study with special reference to the scientists in the Rubber Research Institute of India', presented by Accamma C Korah (Reg. No. 4) in partial fulfilment of the requirements for the Master's Degree in Library and Information Science is an original work carried out by her under my guidance.

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ACKNOWLEDGEMENT

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CHAPTER I

INTRODUCTION

1.1 Introduction

Information is an important resource. The progress of modern society depends a great deal upon the provision of right kind of information in the right form at the right time. A specialist might need information to keep himself up to date and well informed in his field of specialisation.

As information is valuable, it must be put to proper use. In order to serve the users efficiently, we must ascertain the needs of users in terms of information. If an attempt is made to ascertain requirements from the users, then they would get a feeling that at least the library is willing to look into their problems. This kind of feedback is essential for establishing a rapport between the library and its users.

The importance of user studies lies in the fact that a knowledge of general characteristics of information users would permit the design of an information system that would, more or less, meet the majority of the needs of the majority of users. But this assumption is not always proved true. The range and complexity of information needs and habits proved to be more varied than had been expected and most studies failed to provide information that could be used for the purpose of an effective information system design. Therefore

it is advisable to choose a system which will be most useful to the majority of users. So what is more important is an accurate and scientific user study. A well systematized user study should be designed with the aid of up-to-date methodologies, so that the specific needs of the different user groups regarding the use of scientific information can be analysed.

1.2 Relevance of the study

In a specialist library, the needs of users vary according to the nature and levels of specialisation. Availability of information is very essential for research purposes. In the present context of information explosion, the scientific literature are abundant and the user do not know its availability or where to look for the information. So proper bibliographic control of literature is necessary. To meet the needs of the users completely, it is necessary to know their requirements fully and precisely. So understanding the information needs and use pattern and making available the information to the user are very essential.

During the past thirty years or so user studies have become an established field. To some extent, this may have been brought about by the development of identifying labels and bibliogrphic facilities.

In the field of information studies, investigations have usually been pursued for their practical value. Paisley has pointed out that "the earliest studies of information needs and users took place within

libraries, information centres, and laboratories because librarians and administrators needed data for service decisions. Many studies were sponsored by professional associations, such as American Psychological Association and the American Institute of Physics, because associations in general were examining their information programs in the light of 'information explosion' and the new technology"[1]. The results of such user studies provide valuable guidance for the proper organisation of literature and will help in the information searches in the research libraries. But, similar studies among the scientists in the field of rubber research have not been conducted so far in order to understand their information needs and use pattern. Considering this vital point in mind a user study is conducted by the investigator among the researchers in the Rubber Research Institute of India, Kottayam. As far as the knowledge goes to the investigator, this is the premier study in the field in India.

1.3 Statement of the title and Definition of key terms

The title of the study is "information needs and Use pattern: A study with special reference to the scientists in the Rubber Research Institute of India".

1.31 Definition of Terms

The terms which are not self-explanatory in the title are defined below:

Information needs

It may be described as the eagerness of a user who wants to know what others have done and are doing so that his own work

will benefit from their observations. It embraces the types and extent of literature required by him in the course of study, teaching, research etc. In some cases, information needs will be synonymous with information demands.

Use pattern

Use pattern may be defined as the preferences indicated by the information users to documents in respect of their bibliographic form, language and country of origin, age, etc. and information services either through citations in their own works or through demands or requests made to various information systems and services. Rubber Research Institute of India(RRII)the research department of the Rubber Board was established in 1955 at Kottayam in Kerala. The institute undertakes research in the various aspects of rubber and rubber technology.

1.4 Objectives of the study

The main objective of the study is to ascertain the information needs and use pattern of scientists in the Rubber Research Institute of India. More specifically the study is aimed at the following:

i)   To identify the areas of research in the field of rubber and rubber technology;

ii)   To examine the users' approaches to information in different types of information sources:

iii)   To identify the favourite journal and to prepare a rank list of journals in the field of study;

iv)   To identify the users approaches to sources that are published in foreign languages other than English;

v)   To find out the median age of citations used by rubber sci-
        entists and to find out the obsolescence rate in the literature
        on rubber and rubber technology;

vi)   To examine the nature of search done by scientists for current
        information;

vii)   To understand the search strategy for an exhaustive information
        search on a specific topic;

viii)   To understand the users awareness of services generated
        by the RRII;

1x)   To examine the behaviour of scientists in gathering scientific
        information from external agencies like INSDOC, National Centre
        for Scientific Information etc.; and

x)   To ascertain the adequacy of collection and library services
        in RRII for the research on rubber and rubber technology
        according to users'point of view.

1.5 Significance of the study

        The study is aimed to serve the following

a.   To use the result of the study for the preparation of a users'
        profile;

b.   To use the result of the study to design a need based infor-
        mation system in Rubber and Rubber Technology;

c.   As a helpful tool for information managers and researchers
        in the field of study; and

d.   To demonstrate the adequacy of collection and services in
        RRII and how well this study is useful to both users as
        well as information managers.

1.6 Methodology

The study has applied the following methods:

1. Survey method based on questionnaire

2. Citation method

It was in order to get the broadest corroboration of the study's findings that these two methods were used together.

1.61 Questionnaire Method

Questionnaires, intended to elicit information about user needs and use pattern, were distributed among scientists in the Rubber Research Institute.

Questionnaire (Appendix I) consists of 19 questions, under the heads personal data, user needs, use pattern and use behaviour etc, designed keeping in view of the objectives of the study. Questions are partly objective and partly descriptive. In the preparation of the questionnaire, maximum care is taken to make the questions as simple as possible.

74 questionnaires were distributed among the total population. Out of this, 64 questionnaires were collected duly filled up. Category-wise responses were as follows:

Deputy Directors	7
Rubber Technologists, Plant Pathologist, Botanists, Plant Physiologists etc.	30
Research Assistants	27

1.62 Citation Method

Citation method is found increasingly applied in studying information needs and use pattern of scientists engaged in research in various disciplines. This is an indirect method to determine the actual use of documents or sources. This entails the analysis of the bibliographical references that are usually appended with every research communication. Analysis of such citation can reveal useful information like the relative use of different kinds of documents such as books, periodicals, etc. So in the present study, this method has been used to supplement the questionnaire method.

The institute has produced a number of research papers in the institute's journal and other publications. In order to understand the needs and use pattern of the scientists, these publications were used for citation study.

Citations were collected from 64 available scientific papers published during 1980-88. These include documents such as journal articles, books, technical reports, conference proceedings, theses, patents, standards, annual reports, etc.

The citations in the papers were prepared on 5"x3" slips. The details necessary for the analysis include:

   i) Cited author
   ii) Source document
   iii) Title of source document
   iv) Citing author
   v) Title of citing document
   vi) Year of citing and cited documents etc.

779 citations were collected from 64 selected papers. These citations were arranged in different sequences to facilitate the analysis in respect of different aspects like type of documents used, rate of self citation, average citation rate, most cited authors, citation ranking of periodicals etc.

1.7 Dissertation

Chapter 1 – Introduction: Introduction, objectives, statement of the title, relevance and methodology are presented.

Chapter 2 – Information use studies: Origin, development and trends. Attempts a brief study of the subject information use studies.

Chapter 3   Institutional Infrastructure and Rubber Research. Gives description of the rubber research and institutional infrastructure in rubber research. Rubber Research Institute of India is described in detail with its various activities including library.

Chapter 4 – Information needs and use pattern of rubber scientists: Analytical approach through questionnaire method. Provides the analysis of the questionnaire, bringing out the inferences.

Chapter 5 – Information needs and use pattern of Rubber Scientists: Analytical approach through citation method. Provides the analysis and interpretation of data based on the citations collected from the scientific papers.

Chapter 6 - Summary of Findings and recommendations. Gives the summary of important findings and suggestions for improving the existing library environment.

Appendices 1 Questionnaire

2 List of Journals in Rubber

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CHAPTER II

INFORMATION USE STUDIES: ORIGIN, DEVELOPMENT AND TRENDS

2.0   Introduction

A systematic study of any branch of study warrants a detailed examination of its subject field. The present study being concerned with user studies, an attempt is made here to examine the subject field under its various aspects like origin, development and trends etc.

2.1   Information

Information is the product of human brain in action. It may be abstract or concrete. When an individual begins to think, a variety of images and sensations flash across his mind. This makes some information to accumulate in his mind and his memory retains some pieces of knowledge.

Different individuals may derive a different set of experiences over the same units of thought. And each one's experience on identical units of thought would remain isolated and prove less valuable, if both these individuals do not share their experiences. The individual subjective knowledge of each person is transformed into objective knowledge by each individual's public expression via speech, writing, etc. Objective knowledge is publically observable by all and comes very near to the concept of information.

Information means the communication of knowledge about an event or given condition on the spread of knowledge derived from observation, study, experience or institution. Information may be shared in different ways such as language, graphs, printed documents, photographs, diagrams, formulas, factual and statistical data records, magnetic tapes, punched cards etc. Today information is considered as a basic resource. Every bit of information is as essential as minerals and other natural resources. Indeed, such a resource needs to be used and utilized on global level if our total reservoir of scientific and technical knowledge can be made accessible to developing countries from developed ones. Although information potentially represents a valuable resource but it will be of no value unless its collection, processing storage and retrieval are systematic.

2.2 Information: Definitions

It is not easy to define the term information precisely. Information may be defined as data used for decision making. Information is the data which can be transmitted between individuals, and each individual can make whatever use he can of it.

According to T.N.Rajan 'no universally accepted definition of information yet crystallized, perhaps it will never be crystallized'[1]

Bell has defined information as 'Information is news, facts, statistics reports, legislation,tax-codes, judicial decisions,resolutions and the like'[2] whereas, according to Machlup information as:

(i)   information is piecemeal, fragmented, particular,whereas know-
ledge is structural, coherent and universal

(ii)   information is timely, transitory perhaps ephemeral, whereas
knowledge is a stock largely resulting from the flow, in the sense
that the impact of information may affect the stock of knowledge by
added to it, restructuring it or changing it in any way (though con-
ceivably information may leave knowledge unchanged)[3]

2.3 Types of Information

J.H Shera categorised information into six types.[4] They are:
Conceptual Information, Empirical Information, Procedural Information,
Stimulatory Information, Policy Information and Directive Information.

The ideas, theories, hypotheses about the relationship which
exist among the variables in the area of problem is termed as con-
ceptual information. Experience, the data of research drawn from
one's self or through communication, or from others can be considered
as empirical information. Procedural information related to the means
by which the data of investigation are obtained, manipulated and
tested, it is certainly methodological and from it has been derived
the 'scientific attitude'. Stimulatory information which is environmen-
tally derived is probably most effective when it is transmitted by
direct communication but whether directly or indirectly communicated
it is probably the most difficult of all form of information to syste-
matise. Policy information is the focus of the decision making process.
Collective activity necessitates the definition and objective and pur-
pose, the fixing of responsibility, the codification of rights and

privileges and delineation of functions. Group activity cannot proceed effectively without coordination, and it is through directive information that this coordination is achieved.

2.4 Uses of information

Modern society incessantly produces and uses information. All technical activity in science, industry, commerce or government now takes place in such a complex environment that it must be based on especially acquired information. At the same time every act gives rise to information, and recorded knowledge grow apace. To find information, one seeks within the huge mass now available becomes ever more difficult. If information is to be accessible, it must be organized.

Bringing people with similar interests together is therefore a potent way of organizing the flow of information. An author, by bringing together the topics included in the subject of his book, is organizing information.

Every access to relevant information is highly essential particularly in industrial and research and development sectors. Access to right information to the right user in right time can also pave way to new directions in research and development.

2.5 Information Users

The term 'user' refers to the user of the library/information centre/documentation centre and its resources. Users are individuals.

Users can be divided into different categories on the basis of task assigned to them in a library organization. They may be planners or decision makers belonging to the top echelon of the hierarchy. The users may belong to the middle rung category responsible for the coordination of research activities.

In a university, the user may be either teachers, or research scholars, or postgraduate students. In a Public Library, the users are retired persons, children, housewives, students, general public etc whereas in a special library the users are specialists who are specialising in a narrow field of subject.

The user as such does not exist. In designing information systems, we must classify groups of users. These 'types of users' should be dependent on specific information needs. A 'type of user' is a set of particular information needs and not a group or class of people.

Individuals can belong to several types of users. Information users can be categorised mainly into four groups on the basis of their approach to information in libraries. They are:

i) The 'potential user'i.e. the one who needs information which might (or might not) be provided by specific services of this information facility;

ii) The 'expected user' i.e. the one who is known to have the intentions of using certain information services (eg. all subscribers of an abstract service);

iii) The 'actual user' i.e. the one who has actually used an information service, regardless of whether he derived advantage from it or not; and

iv) The 'beneficiary',i.e. the one who derives a measurable advantage from information services[5].

Similarly, there can be different categories of users on other environments. The categories will vary from library to library.

2.6 Information needs

The concept behind 'types of users' means a set of particular information needs. Information needs refer to individual needs of users regarding information, which should be satisfied by the spedific information system used by him.

The main goal of library is to satisfy the information needs of users. He must therefore know what these needs are. To be able to know them, he must do an investigation using the right methods. Obviously, the concept of "needs" and "users" must be clearly understood.

There are in fact two types of 'needs' as used in this field, which is confusing also. One has to do with kinds of messages, in terms of subject, currency, etc and the other relates to means of supplying them.

Information needs of a user depend on such factors as work activity, discipline, and availability of facilities. They also depend on his hierarchical position in the organization where he works. It has now been realised that information need is a composite concept of different types of requirements and approaches to information.

Information needs can be divided into two broad categories. This is referred to as current awareness and adhoc need. In current awareness, each individual arranges to obtain such information on a continuous basis from services available to him. In adhoc need, for some particular purpose the user needs information and often he needs it quickly. It may be specific that is required or it may be that the user wishes to review all the available information.

Paisley has pointed out that '.... the earliest studies of information needs and uses took place within libraries, information centres, laboratories etc because librarians, and administrators needed data for service decisions. Later many studies were sponsored by professional associations, such as American Psychological Association, and the American Institute of Physics because associations in general were examining their information programs in light of the 'information explosion' and the new technology.[6]

Users of information services may have information needs which they are totally unaware of, but which the information services provider may be able to bring to light. Information provision is not a passive activity, the professionally trained scientist or librarian

has an important role to play as a catalyst in stimulating user awareness and ensuring optimal use of resources.

Use is a complex phenomenon. It is all too easy to fall into the trap of thinking in terms of use and non use, but it is not a black and white issue. There are many in between stages, and today's users may be tomorrow's non users.

Information needs, as Paisley observed in a paper, are affected by a variety of factors which are as follows:

i) The range of information sources available

ii) The users in which the information be put

iii) The background, motivation, professional orientation and other individual characteristics of the user

iv) The social, political and economic systems surrounding the user.

v) The consequences of information use.[7]

2.7 Nature of Information Need

Melvin Voigt has recognized three types of users information needs or approaches. Later on a fourth type was added by other workers in this field. They are:

i) Current Approach

ii) Everyday Approach

iii) Exhaustive approach

iv) Catching or Brushing up approach [8]

2.71 Current Approach

Every active research worker has to keep himself abreast of current developments, up to a fair degree, not only in his specific field of work but also in the broader field or fields of interest of areas, whose developments can substantially change the course of his present work. The worker himself browses through his favourite periodicals, going through the abstract journals etc. This type is called current approach which requires constant interaction with the information system.

2.72 Everyday Approach

This approach stems from the research workers' frequent need, in course of investigation for specific piece of information, such as, data. The nature of information sought in such a situation is very specific and quick answer is usually expected. Librarians are used to calling more or less a similar approach as 'short range reference' queries. Because of its frequency of occurrence, this is called everyday approach.

2.73 Exhaustive approach

Here dependence on documents is very much necessary and dealt with almost all relevant literature on a subject. So it is called exhaustive approach.

2.74 Catching up approach

A research worker may at times need to have a brief but a complete picture of the recent developments of a related subject or subject in which he was not very much interested or which did not come within the area of his main interest. This is likely to be an area in which he is not an expert. As a result of this he is not quite current with the subject. Hence, in such a situation,he expects to have in all the communication system a device which will help him in quickly catching up with the subject.

2.8 Types of Requests

We should be able to identify the different types of information needs as may be expressed by the reader. The user will often present to the library two types of requests.

i) To request to locate and obtain a copy of a particular document for which an author or title is known (item request)

ii) The request to locate documents for which a subject is known (subject request) [9]

The first type of request is more purposive. The second item can be described a current awareness service which may be initiated by the library or by the users themselves.

2.91 User needs and Habits

The need for information - whether required by scientist, technologist or technician-has several sources. There is first a need to be aware of what is currently going on in one's field of work, a need to keep up to date with current progress.

In addition to those more general needs for information for current awareness, to feel abreast of what is vital in his subject, the scientist or engineer also often needs some specific piece of information about a substance, a process, a method, a theory, and so on, because it is pertinent to a particular problem in his research.

The scientist or engineer also occasionally needs another kind of information, systematic and exhaustively comprehensive. He needs from time to time all relevant information on a given subject.

2.92 User characteristics

Lohmann offers 8 user characteristics that if evaluated, would help the librarian in his efforts to satisfy user need. There are functional reading level, interest level, satisfaction level (pleasure derived from reading), capacity level, visual level, personality level, variability level, and vocational-avocational level.

Oates asserts that two types of information need exist in any organization, information about organization itself, and information about external environment in which the organization is to function.

Needs vary with time, with user, with purpose, with location, with alternatives and so on.

Glass observes that science is now entering in an age of restricted growth. Among the limiting factors he lists growth in the volume of inadequately available (unindexed) literature, and increased specialization of scientists and engineers, leading to inadequate cross communicating among them.[10]

2.93 Theoretical Concepts of User needs and behaviour

Menzel distinguishes between 4 kinds of known approaches. They are User studies, Use studies, Dissemination studies and Comprehensive study programmes.[11]

According to the models of Paisley, Allen et al. Menzel's classes might he comprised under: Dissemination studies, User and Use studies, Information Behaviour studies, Factors that cause a certain information behaviour, the relationships betwen problem solving behaviour and information behaviour and its controlling factors.

When approached from the point of view of scientist or technologist, they are studies of scientist communication behaviour. When approached from the point of view of any communication medium, they are Use Studies. When approached from the point of view of science communication system, they are studies in the flow of information among scientists or technologists.

Menzel[12] has made the point that many if not most of the user studies that have been done have failed to make use of the data they have produced or collected. This is a function of the purposes for which the studies were done. There are two broad classes of studies, when viewed in terms of purposes or applications. One class is basic studies, on which the purpose is to create or obtain knowledge regarding communication patterns and the reasons underlying them, with no particular application to specific programs or systems. The second type of study might be termed applied. This is also known as operations research. Here the purpose is generally to formulate decision or answer questions regarding specifically identified entities.

2.94 User studies

In the library and information system, the user occupies the key position. In his absence, one cannot think of any such system. Therefore, his/her requirements, needs and aspirations from the library and demands must be fulfilled. This requires a thorough study of what the users want, what they think abnout ½the library and how they feel about the total environment prevailing inside it. The vast majority of User Studies in Science and Technology fall into one of two categories.

i) They study the information requirements of particular disciplines, For eg; Chemistry, Physics, Zoology; or

ii) They are limited to a particular research establishment
or industry where they may cut across subject boun-
daries.[13]

2.941 Definition

User Studies is a difficult area of knowledge to define. The
term User studies comprises the study of people's need for, and
use, of information.

"Empirical Studies of the use, the demand, or need for, infor-
mation are usually called user studies"[14]

The following is the working definition of User Study by
Centre for Research on User studies. 'The general objectives of rese-
arch on users is to further understanding of the processes of informa-
tion transfer. The research may be expected to lead to the improve-
ment of information transfer systems of all types and to have implica-
tions for the organization of communication, the distribution of resour-
ces and the relationships between systems.[15]

2.942 Types

In the information field, User studies may be either descri-
ptive or prescriptive.

A descriptive study describe how information transfer takes
place in relation to a particular user population. The users for eg,
may be patrons of a library or subscribers to an abstracting journal.

A prescriptive study will go one step further and suggest ways in which the prevailing system or product could be modified or upgraded to ensure a greater degree of user satisfaction.[16]

Past studies of the subject have appeared in the literature under various titles. They include, "Information Use Studies", "Literature Searching Use Studies" "Information needs Studies" or "User needs studies"

Brittain argues that user studies should be concerned with the 'growth and structure of knowledge, with the creative process, the way in which knowledge accumulates, its transmission as well as with the psychological aspects of information flow."

According to another classification, User studies include Use Studies, Behaviour studies and Information flow studies.

Herbert Menzel has given another categorisation: Preference Studies, Demand Studies, Experimental Studies, Use studies and Dissemination Studies.

Use Studies developed in large part as a response to tremendous growth in science and technology subsequent to World War II.

Surveys which are conducted to find out the use of any communication medium, such as a primary periodical, a secondary periodical etc. are called use studies.

Two comprehensive bibliographies of 'user studies' published in 1964 and 1965 contained 438 and 676 items respectively.[17]

Two important studies of Voigt and Vickery were published in 1961. In one of the surveys reported by Urquhart it was found, "38% of the physicist questioned stated that they had found the reference in an abstract journal. This compares well with a total of 49% of chemists using an abstracting journal. Similarly in later studies of BLL it was revealed 21% of the social scientists and 30% of the biomedical workers reported that the reference has been obtained from an abstracting journal"

In 1967, Herner and Herner lamented the current approaches of use studies and delineated 6 valid techniques for gathering data. Paisley in 1968 pointed out the need for a conceptual frame- work and stressed the importance of viewing a scientist within the cognitive, emotional and social systems, when addressing information needs and uses. Allen (1969) extended Paisley's approach and stressed the scientist as an information processor and communicator within a work team, professional society, invisible college, or other organization. Crane, in 1971, focused on social organization in research areas and the diffusion of information through formal and informal communication systems, especially at the research front. 3 years later, Martyn observed that use studies were now broadening into areas outside science and technology, using more refined sociological techniques, and focusing on system- oriented studies on background research cognition and behaviour.[18]

Types of Use Studies are:

a) Channel studies i.e. the studies on the actual frequency of use of particular information channels.

b) "Inefficient" utility studies i.e. studies of the benefits of seemingly inefficient communication activities.

c) Studies which do not concentrate on a particular channel but characterize information habits and behaviour no matter what channels and facilities are involved.

d) Critical incident studies i.e. studies which analyse the information behaviour on specific 'problematic situations' A special form consists of the so-called 'Decision Studies' which restrict the problematic situation to certain situation of decision.

e) Dissemination studies

These are studies which are generally concerned with the professional communication process. With regard to sources, authors and dissemination mechanism, particularly of scientific and technical information. It must be regarded as a deficiency that research in other disciplines, which deal with structurally and substantially similar problems, remains unconsidered. eg: innovation research, technology transfer, mass communication research.

f) Comparative study programs

Under the headings are subsumed all those widely spread studies of information needs and behaviour which comprise

several or all points of view mentioned under 1 to 3 (ie User studies, Use studies and Dissemination studies) and cannot be classified into any one of the three groups.

2.943 Importance of User Studies

Librarians are becoming increasingly aware of the needs to study users as a means of making more informed decisions about library services and priorities. Such studies seem even more necessary when precious library budgets have to stretch as far as they do today. User Studies, in applying social science research techniques to the practical problems of serving library clientele, can help to provide librarians with at least some of the information they need to make these decisions.

User studies have now been well accepted and performed by various methods. There is considerable accumulation of literature on user studies and more and more is being generated as can be judged more from the reviews appeared in the subject. The establishment of the Centre for Research on User Studies in UK is another testimony to the importance of user studies.

The main objectives of User study are:

i)   to judge the limitations of library system and services

ii)   to exploit resources at the least expenses of money, time and energy

iii)   to enhance the quality of acquisition and collection

iv)   to improve the science communication system

2.944 Earlier Studies

During the past 30 years or so user studies have became an established field with some degree of cohesion. To some extent this may have been brought about by the development of identifying labels and bibliographical facilities. There are information science abstracts (formerly Documentation abstracts) and library and information science abstracts). Both these abstracting journals include sections on user studies.[19]

Most of the earlier studies were based on indirect methods, like citation counting of recent documents, library use records, reference records etc. Such studies can bring out some aspects of the use of literature. A complete picture of the functioning of the entire system of communication and its components was needed. This resulted in the use of more direct methods of studies in information use and information gathering habit surveys of user communities.

There has been a Niagra of studies in the field of user studies.[20] An earlier user study in the field was conducted in the late 1930s by Louis R Wilson. This study was an attempt to investigate the distribution and status of libraries in the United States. A report of the study 'The Geography of Reading' was published by the American Library Association and University of Chicago Press. Perhaps

the ambitious user study ever undertaken in Public Library Enquiry, conducted in the late 1940s by the social science Research Council with a grant from the Carnegie Corporation of New York.

The Royal Society's conference held in London in 1948 and the Washington Conference of 1958 helped much to focus documentalists concern and interest in this area. Before Washington Conference, there appeared one of the most important studies entitled 'Pilot Study on the use of scientific literature by scientists' conducted by Ralph R Shaw.

In 1963, findings of the 'access to public Libraries' study were reported to the ALA Council.

Another series of review articles on information needs and users are now available in the volumes of the Annual Review of Information Science and Technology since 1966.

'Use made of Technical Libraries' is a report based on the findings of a user study conducted by M Slater and P Fisher in 104 scientific and technical libraries in UK.

The period of 1967 and late 1966 brought in bumper crop of user studies, high in individual quality as well as quantity.

Gushee (1968) noted that scientists themselves have been the most active in studying information requirements and the transfer of information between researchers; and the earlier references came

from Chemistry, although recently physicists and psychologists have been researching into their own literature requirements.

At Bell Laboratories Library and Information systems Center, a study was undertaken to evaluate the acceptability and use of microfiche and to measure the effects of microform formats on reading habits.

Government publications and their use by faculty members were examined in another user study at Case Western Reserve University.

Another study was conducted by Cambridge University's Management Research Unit to develop techniques to measure the use and effectiveness of library services. Another example of user study was conducted at several colleges and universities in California, where investigators attempted to measure faculty awareness.

2.95 Methodology

Once the users have been identified, then determine their information needs and behaviour. This means find out the types, kinds, levels and amount of information needed by the users. Information behaviour is concerned with how and from where be gets the information.

Wood has reviewed and classified the methods that have been employed in studies of information users and their needs. He lists 5 general methods.[21]

i) Questionnaires

ii) Interviews

iii) Diary methods (Systematic self observation by the user)

iv) Observation (By the person studying the user)

v) Analysing of existing data

Guha has classified the methods used for user studies as below:

a. General or conventional methods

1. Questionnaire

2. Interview

3. Diary

4. Observation by self

5. Operations Research study

b. Indirect methods in the context of information use

6. Analysis of library records

7, Citation analysis

c. Special and unconventional methods

8. Computer feedback

9. Unconventional methods[22]

2.951 <u>Questionnaire method</u>

Questionnaires are the most common devices employed in measuring library use and library use attitudes. A questionnaire is essentially a skillful translation of objectives into a set of questions intended to be answered in writing:

    a) The individual question may be of different kinds asking for different kinds of answers.

    b) The question may be for knowing the facts.

    c) Question may be objective which requires the answer 'yes' or 'No'

Purpose

a) Those aimed mainly at ascertaining facts

b) Questions aimed mainly at ascertaining beliefs about what the facts are

c) Those aimed at ascertaining feelings

d) Questions aimed mainly at discovering standards of action

e) Exploration of present or past behaviour

f) Questions aimed mainly at conscious reasons for feelings, policies or behaviour

There are mainly 2 types of questionnaires, structured and unstructured.

Structured questionnaires contain preordain, definite and concrete questions. This type of question is prepared in advance. Unstructured questionnaire is used as a guide at the time of interview. It is used to help interviewer to avoid omission of any relevant point.

Questions can also be grouped into 4 types

i) Open ii) Closed iii) Mixed iv) Pictorial

The following are some of the advantages of a questionnaire method:

i) Allows a wider range and distribution of the sample than the survey interview method.

ii) Provides an opportunity for respondents to give frank, anonymous answers

iii) Allows greater economy of effort

iv) Can be constructed so that quantitative data are relatively easy to collect and analyse.

v) Can be designed to gather background information about respondents, as well as original hard-to-obtain data.

vi) Facilitates the collection of large amounts of data in a short period of time.

vii) Can be completed at the leisure of respondents without imposing on research subjects

viii) Because of its fixed format, helps to eliminate variation in the questioning process.

The major disadvantages of a questionnaire method are the following:

i) Precludes personal contact with respondents, perhaps causing the investigator to gain insufficient knowledge about participants in a study

ii)   Does not allow respondents to qualify ambigous questions

iii)   Difficulty in obtaining responses from a representative cross
        section of the target population

iv)   Poorly worded or direct questions might arouse inhibitions
        on the part of respondents.

v)   Verification of the accuracy of the questionnaire responses
        might sometimes be difficult, or even impossible

vi)   Uneducated subjects might not respond to a list of printed
        questions

vii)   Most of the questionnaires cannot be designed to uncover
        causes or reasons for respondents' attitudes beliefs or actions.

2.952 Interview Method

Interview involves personal interaction; questions being posed
in a face to face situation. Interview may be of two types.

a) Structured Interview b) Unstructured Interview

When a set of questions are asked in a previously formulated
questions set in a particular order are called structured interview.
This method has less degree of flexibility.

In unstructured interview, there is no fixed order number
of questions. Answer of one question may be asked as the basis of
next question. This has great degree of flexibility.

2.9521 Importance of Interview

i)   Interview is a means to get direct knowledge from the person concerned. Therefore it is reliable information.

ii) Reactions of respondents can be understood and seen more closely

iii) It is possiible to study past, present and possible future behaviour of human beings

iv) It enables one to study abstract factors

v)   Flow of information between interviewer and interviewee

2.9522 Limitations

i)   This method provides subjective information

ii) Personal factors, emotions and sentiments are many. But real issue may not be revealed. So data may be unrealistic and invalid.

iii) Current information may not be elicited, due to:

Respondent may be unwilling to reveal truth

Respondent may also be emotionally overriden

Respondent may also unable to speak out

iv) If the interviewer is not an expert, ideal results may not be obtained.

v)   Time consuming costly method

vi)   Personal and highly delicate things may not be available or
cannot be obtained.

Success of interview depends on personal quality of intervie-
wer. He must be shrewd, tactful, objective trained, cooperative and
well versed in human psychology and intuition.

2.953 Diary method

The characteristic of this method is that individuals under
study are asked to keep a detailed record of particular information
activities eg: searching for information, actual reading, discussing
with colleagues, library use etc. for a given period of time.

Diary method is not reliable to justify further studies. This
method may be tried for short period. If the study aims at obtaining
facts about scientists' habits rather than preferences and views, then
diary method will be suitable.

One modern variation of the method is the tape recorded self
observation by subjects during working hours. The technique is same,
only the method of recording is different.

2.954 Observation By Self

Observation may be defined as the careful and systematic
watching of facts as they occur in the course of nature.

Observation by self is a modification of diary method. In this method, users themselves conduct the survey. Selected members of users are given data sheets. By analysing the data, use pattern can be studied. Demand on the subjects efforts and time is considerably less than the diary method. Hence there is greater possiblity of obtaining complete records. Recording forms may also be in the nature of checking off type.

2.955 Operations Research Study

This method is actually observation by others. Selected participants are observed random times during working hours and the time spent on various information activities recorded.

2.956 Analysis of library records

Various types of library records have been used by librarians to elicit useful information.

i) Records of reference questions

ii) Records of literature search

iii) Use of various types of documents

iv) Circulation record etc.

All these can be utilized in the design and improvement of library services, to determine the activities of a library, and to determine reader habits of library users. These records will be complete in library where the users are made to fill in the request slips

for item to be used in or out of the library. The use of books or other material kept on the open shelves cannot be determined by this method.

A closely related method is the analysis of the personal indexes used by the researchers. After every use of such an index, researchers are asked to note down why a particular item was used, which heading was used to get the item and so on.

2.957 Citation Analysis

This method is to determine the actual use of documents or sources. This entails the analysis of the bibliographical references which are usually appended with every research communication. Analysis of such citations can reveal useful information like

a) The relative use of documents such as books, periodicals, reports, patents etc.

b) Age of documents

c) Scattering of literature

d) Most frequently used titles

e) Language preference

2.9571 Drawbacks

i) It reveals only a part of the picture

ii) Citation could not reveal the use of secondary or tertiary sources

iii) Citation counting could not reveal the use of different channels of communication available to any user to go to primary sources.

2.958 Special and Unconventional Methods

Computer feed back

With the availability of use of computerized information ser-
vice, this technique is now available. Essentially this method takes
use of records obtained as by products of a computer search. This
technique is used to generate clues for the improvement of search
strategies within the limited context of individual computerized system.

2.959 Unconventional Methods

It is unstructured approach. Eg: Delegates of a conference
offered their critical opinions and evaluation of the service provided
and suggested possible improvements.

2. 96 Criticism

Until now the most predictable and justified complaint against
user studies has been defective methodology. Many peopleperformers,
as well as foes of 'user studies'-still falsely identify these studies
with opinion polls.

The following are some of the criticisms levelled against the user
studies

i) Sample of population surveyed has not been selected properly. In
some cases sample is not clearly defined.

ii) Most of the samples are very limited in nature. i.e. workers within
the same organization or workers within the same discipline etc.
This affects survey results.

iii) The diverse classification of communication-channels, diverse units of observation, incorrect selection of technique of surveys indicates the instances when the collected data have been inadequately analysed.

iv) Most of the surveys have failed to take into consideration the context of library and information facilities available to the sample population or the population group as a whole.

2.97 Conclusion

A need based information service is considered an utopian concept in libraries in developing countries because of number of problems. But needbased acquisition of documents along with proper user studies and user education programmes will make user oriented information service a reality. Information is a very important national resource. It is the duty of all concerned to provide right information at the right time in the right media for building up a society which is rich in information. For this, user study is a precondition.

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CHAPTER III

INSTITUTIONAL INFRASTRUCTURE AND RUBBER RESEARCH

3.0 INTRODUCTION

In the present chapter a brief account of rubber, rubber research, literature on rubber etc. are given. It also provides an assessment of the institutional infrastucture available in India and abroad for research in rubber and the progress made in the field.

Hevea brasiliensis, the Para Rubber tree belonging to the Euphorbiaceae family, produces 99% of the natural rubber in the world. Natural rubber which is one of the most versatile vegetable products, has manifold uses. More than 35,000 rubber based products are available in the market and there is hardly any segment of life which doesn't make use of these goods.

Christopher Columbus is believed to have first found rubber somewhere in Tropical South America. It was introduced to Tropical Asia in 1876 by Sir Henry Wickham with the seeds bought from Brazil.

With a few centuries of its introduction in the agricultural and industrial scene, thus rubber tree and its products had really changed the face of the world. Over 30 million people in this world are now dependent on natural rubber. Its production during the last year was estimated to be 4,430,000 tonnes and its consumption around 4,385,000 tonnes[1]. The total area under rubber cultivation all over the world is about 7.717,000 ha.[2] Indonesia, Malaysia, Thailand, China,

India and Sri Lanka are the major rubber producing countries. The rubber tree is also grown in Nigeria, Liberia, Vietnam, Laire, Burma, Philippines, Ivory Coast, Cambodia, Brazil, Bangladesh, Mexico and Cameroon United Republic.

3.1   Rubber Research: An overview

The first half of the century saw a complete revolution in rubber cultivation. Since the emergence of international and national organisations in the field of natural rubber research, a proliferation of scientific rubber related literature can be observed. Rubber which is now more closely related with plastics saw great information expansion between 1940 and 1960 due to the rapid development of synthetic rubbers.[3] The literature 'information spectrum' and explosion of both primary and secondary information on plastics and rubber is vividly illustrated by Yescombe, E.R.[4].

3.2 Rubber Information Flow
3.21 Literature Pattern

The primary literature represents new knowledge or new interpretation of old knowledge and include the latest available information. These include conference proceedings, patents, periodicals, research reports, theses, dissertations and trade literature.

Secondary sources are compiled from the primary sources, arranged according to some definite plan. They repackage information

from the primary source in a more convenient form and guide the researcher in a more convenient form and may also guide them to original documents. These include the following literature types, abstracting, indexing and reviewing periodicals, reference books and treatises, monographs and text books.

A list of primary and secondary sources of rubber literature are given as Appendix II.

3.22 Nature of Rubber Literature

The major areas of rubber research can be broadly grouped under three major areas. They are:

i)   Agricultural/Botanical aspects of rubber

ii)   Technological aspects of rubber

iii)   Economic aspects of rubber

3.23 User community of Rubber information

Scientists, Researchers Agriculturists, Businessmen, Industrialists, Private companies, Business firms etc. include the user community of rubber information whereas scientist and researchers need all aspects-agricultural/botanical, technological and economic aspects-of rubber information, industrialist and business companies need both technological and economic information about rubber and the cultivators need mainly agricultural information.

3.24 Producers of Rubber Information

The user community itself is the main producers of the rubber information. The international and national organisations, the researchers and the private companies in the field is responsible for the majority of rubber literary output.

3.25 Communication Pattern of Rubber Information

The rubber information pattern is shown in Fig I. The available literature is used by the rubber information user community with the aid of secondary sources etc. They pave the way to new discoveries and inventions resulting in new scientific literature. This in turn contribute to the available rubber literature and the cycle repeats

3.3 Rubber Research: International Scene

In 1960 some 300 organisations spread over 44 countries covered the needs of the plastic and rubber industries and thus research activities. Its number has increased over the past two centuries and a consolidated list is provided by Yescombe.[5]

The names, objectives, publications etc of some important international organisations are given below:

i) Association of Natural Rubber Producing Countries (ANRPC)

ANRPC was inaugurated at Kuala Lumpur, Malaysia, in 1972 to stabilise the world's natural rubber prices. Founder member

RUBBER INFORMATION FLOW

BIBLIOGRAPHIC INFORMATION

Books
Periodicals
Abstract/Digest
Conferences/Symposia/Proceedings

Report
Patent
Standards
Tech-Reports
etc.

PERSONAL

Scientists
Researchers
Industrialists

Farmers
- - - -
Others

INSTITUTIONAL

IRRDB
RRIM
IRSG
ARPC
MRRDB
IRMRA
RRII
Private Business Farmers
Others
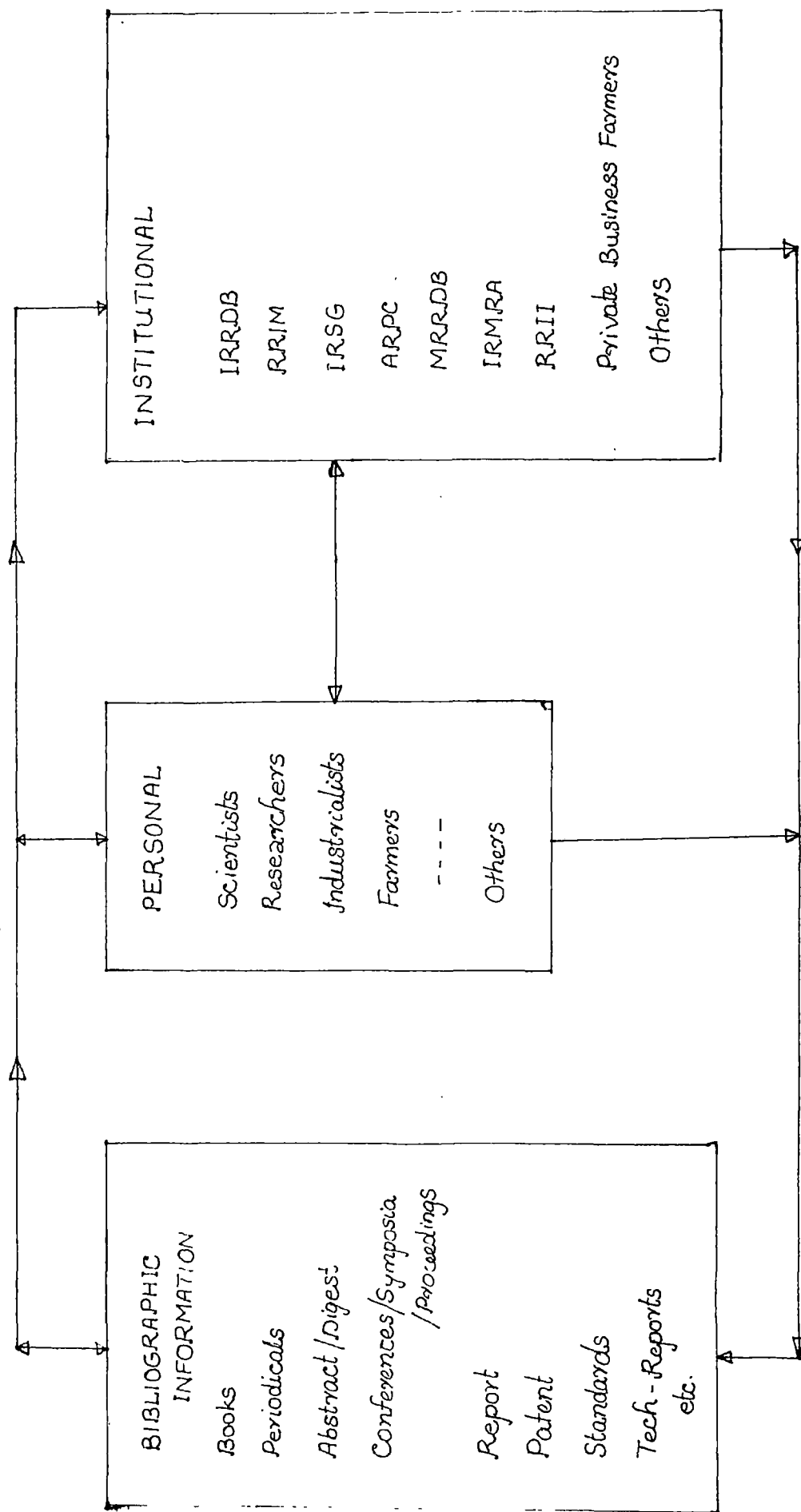
FIGURE-1

countries include Sri Lanka (Ceylon), Indonesia, Singapore, Thailand etc. Objectives include: labour co-ordination in the production and marketing of natural rubber; promotion of technical co-operation; bringing about a fair and stable price of natural rubber. It was agreed to establish a Joint Regional Marketing System for natural rubber.

ii) International Institute of Synthetic Rubber Producers Inc. (IISRP)

IISRP was formed in 1960 by 14 synthetic rubber producing companies, when global synthetic rubber consumption exceeded natural rubber for the first time.

The overall purpose of IISRP is to promote and further the interests of the general public in manufacturing, engineering, safety, transportation and many other aspects of the synthetic rubber industry.

iii) International Rubber Study Group (IRSG)

IRSG is an intergovernmental organisation comprising Australia, Austria, Belgium, Brazil, Burma, Cambodia, Canada, France, Denmark, Germany, Sri Lanka, Thailand, UK, India, Indonesia, Japan, the USA and Vietnam. IRSG meets biennially to study the consumption and supply of rubber, both natural and synthetic, on an international basis.

Periodicals: Rubber Statistical Bulletin; Quarterly Rubber Statistical News Sheet; International Rubber Digest; and a monthly press release.

iv) United Nations Industrial Development Organization (UNIDO)

UNIDO was established in 1967.

UNIDO has published polymer publications for developing countries, and provided advice, contacts and training facilities in plastic technology institutes e.g.CEPET, Madras; pre-investment studies, provision of experts; and fellowships and equip for demonstration.

2.4 National Organisations

Major national organisations their objectives, activities and publictions are given below:

i) Rubber Research Institute of Malaysia (RRIM)

Prior to September 1973 RRIM was known as the Rubber Research Institute of Malaya. RRIM is controlled and financed by the Malaysian Rubber Research and Development Board. The Government and the planting industry was represented on the Board of RRIM.

RRIM has an extensive library and issues a list of accessions.

Publications: Journal of the RRIM; Planters' Bulletin; Reports; RRIM Library bibliographies; and RRIM Planting manuals.

ii) Rubber Research Institute of Sri Lanka (RRISL)

RRISL divisions include Genetics, Soils Chemistry, Rubber Chemistry, Plant Pathology and a Statistical Section, with Estate and smallholding Departments. RRISL maintains a Library.

Publications include Annual Review, Quarterly and Advisory circulars.

iii) Rubber Research Centre of Thailand

The Centre issues reports at intervals. Some of them are confidential in nature.

iv) Rubber Research Institute of India (RRII)

RRII was established in 1955. Publications include Indian Journal of Natural Rubber Research and Annual Report of Rubber Research Institute of India.

3.5 Rubber Research: Indian Scene

The Rubber Board is the most important organisation in the field of Rubber Research in India. The other organistions in India include:

i) All India Manufacturers' Association

ii) All India Rubber Industries Association

iii) Indian Rubber Manufacturers' Research Association (IRMRA)

iv) Association of Rubber Manufacturers in India

3.51 Rubber Board

The Rubber Board was constituted under the Rubber (Production and Marketing) Act, 1947. This Act was passed on the recommendation of an adhoc committee appointed by the Government of Indiia in 1945, and came into force on 19th April, 1947. The Rubber

Production and Marketing (Amendment) Act of 1954 made certain changes in the constitution of the Board and shortened its name to the Rubber Board. This Act came into force on 1st August, 1955. The Rubber Act of 1947 was further amended by the Rubber Amendment act 1960 which made certain alterations in the rate and procedure of collection of cess on rubber. The Act was again amended by the Rubber (Amendment) Act, 1982.

When ceiling on ownership of landed assets was imposed by land reform legislations, plantation crops like rubber, coffee, tea and cardamom were exempted from ceiling, in view of their strategic importance or export potential. This encouraged many land owners to switch over to cultivation of plantation crops like rubber. A sizable part of land in South India was brought under Rubber Plantations. The agrarian reforms together with research, extention, and advisory activities of the rubber board as well as the various forms of incentives and assistance offered by the Rubber Board, and the hard working and research and nature of people to adopt scientific methods of cultivation, have contributed to the systematic development of rubber plantation industry in India.[6]

3.511 Rubber Board - Organisation

The Chairman is the principal executive officer and he exercises control over all departments of the Board. The activities of the Board are classified under six departments viz. Administration,

Rubber production, Research, Rubber Processing, Finance and Accounts and Training.

3.512 Publications

The Board publishes books, periodicals and pamphlets to popularise the schemes for the development and progress of the rubber industry in India and to disseminate scientific knowledge on modern methods on rubber cultivation and processing. The publications/journals are:

i) Handbook of Natural Rubber Production In India

ii) Rubber Board Bulletin

iii) Rubber (Malayalam Monthly)

iv) Rubber Statistical news

v) Indian Rubber Statistics

vi) Rubber Grower's companion; and

vii) Advisory Pamphlets

3.52 The Rubber Research Institute of India

The Rubber Research Institute of India-the Research Department of the Rubber Board-was established in 1955. The Department is headed by a full time Director of Research. The Institute is located on a hillock about 8 Kms east of Kottayam in an area of 35 hectares. The major research divisions of the institute are Agricultural Economics, Agronomy and Soils, Biotechnology, Botany, Mycology and Plant Pathology, Plant Physiology and Exploitation and Rubber Chemistry Physics

and Technology, each functioning under a Deputy Director. The Institute has also technical supporting sections like Library and Documentation, Instrumentation and Art and Photography. There are two experiment stations in Kerala attached to the Institute, one of 33 hectares in extent, at the Head quarters, and other, Central Experiment Station,258 hectares in extent, at Chethackal 50 Km from Kottayam. The Institute has established a Regional Research Complex in North-East India, with Research Stations in Agartala (Tripura), Guwahati(Assam), Tura and Darachikgre(Meghalaya) and Kolasib(Mizoram). The Institute has also Regional Stations in Dapchari(Maharashtra) and Kamakhyanagar (Orissa). For the specific function of plant breeding and initial evaluation, the Institute has established breeding stations in Paraliar(Tamil Nadu) and in Subramanya(Karnataka). Regional Analytical laboratories have also been established in Thodupuzha, Calicut and Nagercoil for soil and leaf analysis for advisory purposes, with a mobile library attached to each.

3.521 Major Activities

The major activities are breeding, mutation breeding, clone trials, new germplasm, tissue culture, lipid composition of leaves, ecophysiology, exploitation, rubber chemistry and technology, agro-meteorology, intercrops, cover crop, diseases, weed management, pest control, reclamation, agricultural economics etc.

3.522 Research Divisions

The broad lines of research undertaken by the divisions are the following:

3.5221 Agronomy/Soils division

The thrust areas of research in Agronomy/Soils division are investigation on nutritional requirements of different classes in different regions,studies on discriminatory fertilizer recommendations,agromanagement practices including irrigation, inter cropping and weed control.

3.5222 Biotechnology Division

This division is to perfect biotechnical techniques for generation of elite materials and to attempt cellular manipulations for rubber crop improvement.

3.5223 Botany Division

The botany division concentrates on tree improvement, propagation techniques, cytogenetics, anatomy and germplasm collection and conservation. The major activities include breeding, ortet selection, mutation and polyploidy, clone evaluation, cytogenetics, bark and wood anatomy, propagation techniques, horticultural manipulations, genetic studies, floral biology, introduction collection and conservation of germplasm and identification of early selection parameters.

3.5224 Pathology Division

Pathology division consist of Plant Pathology, Mycology, Entomology, Microbiology and Meteorology sections. The main activity is crop protection. The Microbiology section is engaged in the work of improving soil fertility through microbes and also pollution control with microbes.

3.5225 Plant Physiology division

The thrust areas of plant physiology are yield component analysis at whole tree level, physiology and biochemistry of latex production and flow, development of physiological and biochemical methods of early production of yield potential and stress tolerance. Another is the exploitation system.

3.5226 Rubber Chemistry Physics and Technology

The thrust areas of research include

i)   Primary processing of Natural rubber

ii)   Chemical modification

iii)   Reclamation

iv)   . Rubber Technology

3.5227 Agricultural Economics

The division undertakes economic studies connected with various investigations.

3.523 The Central Experiment Station

A 250 ha. Central Experiment Station (CES) of the Rubber Research Institute of India at Chethackal, Ranny,50 Kms away from the Board's headquarters, was started in 1966. Experiments have been laid out in the entire area by the Botany, Agronomy, Pathology and Plant Physiology divisions of the RRII.

3.524 Research complex in North-Eastern Region

The Rubber Research Institute of India has established a Research Complex for North-Eastern region with headquarters at Guwahati. The complex has stations in Meghalaya, Assam and Mizoram, in addition to the existing Regional Research Station at Tripura. The complex will cater to the demands of the North-Eastern states in conducting location-specific research, providing technical advice and improved planting materials, etc; for expanding rubber cultivation to this non traditional tract.

3.525 Trial Rubber Plantation Project at Maharashtra

The Trial Rubber Plantation Project, an Experimental Station at Dapchari, about 145 Kms away from Bombay in Maharashtra State was established in 1981.

3.526 Hevea breeding station

The Institute has established a Hevea Breeding station comprising of two sub stations, one in Parliar and the other in Nettana.

3.527 Regional Research Station, Orissa

The RRII is establishing a Regional Research Station in Kamakhianagar.

3.528 Mobile Soil plant tissue testing laboratory

The Institute has put into service five mobile soil and plant tissue testing laboratories for giving on the spot fertilizer recommendations to small growers based on soil and plant tissue analysis.[7]

3.53 Other activities

Besides its major research functions, the Institute also gives advisory and consultancy service to plantations and small scale industries. The Institute conduct training courses for the plantation managers. In the academic scene, the institute collaborates with Cochin University and Kerala Agricultural University in conducting a B.Tech course in Polymer Science and Rubber Technology and Postgraduate diploma course in natural rubber production, respectively. The Institute has established research linkages with National Chemical Laboratory, Pune; Indian Institute of Science, Bangalore; Kerala Agricultural University, Trichur; and IIT, Kharagpur. Banaras Hindu University, University of Kerala and Cochin University have recognised the Institute as a centre of learning for Ph.D work. The institute has also been recognised by the International Rubber Research and Development Board (IRRDB) as a Centre of excellence for training in the field of plant physiology

R R I I   LIBRARY

(POSITION AND STAFFING)

RUBBER BOARD
CHAIRMAN

- Administration (Secretary)
- Rubber Production (Rubber Production Commissioner)
- Research (Director of Research)
- Rubber Processing (Project Officer)
- Training (Joint Director)
- Finance & Accounts Financial Adviser

Under Research (Director of Research):

- Agronomy (Deputy Director)
- Bio-technology (Deputy Director)
- Botany (Deputy Director)
- Pathology (Deputy Director)
- Plant Physiology (Deputy Director)
- Rubber Chemistry, Physics & Technology (Deputy Dir)
- Agricultural
- Other Regional Research Stations
- Library (Documentation Officer)

Under Library (Documentation Officer):

Professional Staff
Librarian (Senior)
Librarian (Documentation)
Technical Assistants (3)

Others
Reprographic Asst
Catalogue Typist
Record keepers (2)

FIGURE - 2

and has also been charged with the responsibility of organising an international research project on production and stress physiology. Being an active member of the IRRDB, the Institute has been associated with UNIDO projects on composite rubbers at MRPRA, UK and Liquid Rubber in Ivory Coast. Many international fellows have been trained by this institute in various disciplines.

3.54 Library and Documentation Centre

The Institute has a library and documentation centre with a collection of over 25,000 volumes of books and bound journals covering the various subjects of interest to the organisation. The library maintains a fairly good stock of standards, preprints/ reprints, photocopies, microfilms and other documents and receives around 550 current periodicals. As part of documentation and information service, the library issues weekly bulletins giving daily price of natural rubber at international markets and library information bulletin. The library has reprographic unit. Facilities and services are also extended to planters, manufacturers and others connected with the industry and to students, research workers etc of outside institution.

Services performed by the library include:

a)   Book delivery service

b)   Referral service

c)   Reprographic services

d)   Translation services

e)   Document/Reprint/Preprint procurement service

f)   Current Awareness Services

      i) Monthly additions

      ii) Rubber Alert

      iii) Weekly bulletin of rubber prices

3.6 Conclusion

Natural rubber, with its manifold uses, had its impact on all areas of human life. Its cultivation, production and utility is increasing day by day. This research in rubber related subject has upmost significance among scientists not only of India but internationally. Among the international and national R&D organisations, RRII has a significant role in this field of natural rubber research.

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CHAPTER IV

INFORMATION NEEDS AND USE PATTERN OF RUBBER SCIENTISTS: ANALYTICAL APPROACH THROUGH QUESTIONNAIRE METHOD

4.0 Introduction

Studies on the fields of interests and use pattern of users are perhaps one of the most important and effective methods of understanding their information requirements. The implicit assumption of user studies is that if one understands user interests, needs and use pattern, one can design information system more effectively.

In order to understand the fields of interests, information needs and use pattern of the scientists of Rubber Research Institute of India, Kottayam a study was conducted using the questionnaire method and citation analysis. Data collected through the questionnaire is analysed in this chapter and analysis of data collected through the citation method is given in Chapter 5.

74 copies of the questionnaires were distributed among the users out of which 64 were responded. The response rate was 86.48 per cent.

The primary data collected through questionnaires was subjected to detailed analysis. Different variables like subject of specialisation, foreign language proficiency, types of information sources, nature and adequacy of the collection, use pattern of information and information services etc. are taken into account for the analysis and interpretation of the collected data. The major findings evolved out of the

study are recorded elsewhere. The analysis is undertaken under the following heads:

4.1 Position-wise break up of scientists

Out of the 64 respondents, there are 7 Deputy Directors (10.94%), 30 (46.88%) scientists including Rubber technologists, Soil Chemists, Botanists, Plant Physiologists, Anatomists, Plant Pathologists, Entomologists, Microbiologists, Plant Breeders, Statistician, Market Research officers etc. and 27 (42.18%) Research Assistants. It is given in Table No.1 below.

Table 1 Position-wise break up of Scientists

Cate-gory	Designation	No. of scientists	With Ph.D	With Postgraduation	%
I	Deputy Director	7	6	1	10.93
II	Rubber Technologists, Botanists, Plant Physiologists etc.	30	7	23	46.87
III	Research Assistants	27	4	23	42.18

Out of the population, 26.56 per cent (i.e. 17 scientists) are with Ph.D and 47 scientists (73.44%) with postgraduation. In the category I, there are 6 Deputy Directors, with Ph.D and only one Deputy Director with M.Sc. and LPRI. There are 30 scientists in

Table 2   Area of Specialisation

Name of Subjects	No. of Researchers	%	Rank No
Botany (includes Genetics, Plant breeding, Cytogenetics, Plant Science and Wood Science)	11	17	II
Rubber Chemistry and Technology (includes Rubber Chemistry, Rubber Technology, Latex Technology, NR Vulcanization and Polymer Chemistry)	13	20.3	I
Agriculture (includes Agronomy, Soil Chemistry, Agricultural Chemistry, Fertilizer Management and Instrumental methods of analysis)	8	12.5	III
Agrometeorology	1	1.56	VII
Plant Physiology (includes Biochemistry)	8	12.5	III
Plant Pathology (includes Mycology, Microbiology, Pollution and Soil Microbiology, Entomology, Agricultuaral Entomology)	13	20.3	I
Agricultural economics	4	6.25	IV
Statistics	2	3.12	VI
Biotechnology	1	1.56	VII
Electronics Engineering	3	4.69	V

the category II and among them 7 have Ph.D, and the remaining 23 have postgraduate degree. In category III, 4 scientists possess Ph.D and the remaining have postgraduate degree.

4.2 Area of Specialisation

Table 2 shows that irrespective of the category of users 20.3 per cent (i.e. 13 scientists) were interested in Rubber Chemistry and technology and Plant Pathology.

From the analysis it can be seen that the maximum number of researchers are interested in the subject areas, Rubber Chemistry and Technology (20.3%) and Plant Pathology (20.3%). The second place goes to Botany and the third position goes to Plant Physiology and Agronomy. The least preference is given to Agrometeorology and Biotechnology.

4.3 Foreign language Proficiency

Out of the 64 respondents, 11 scientists (i.e. 17.19%) have proficiency in French language, 5 each (i.e. 7.81%) have proficiency in German and Russian language.

Table 3   Foreign Language Proficiency

Sl. No.	Language	No. of Scientists	%	Rank
1	French	11	17.19	I
2	German	5	7.81	II
3	Russian	5	7.81	II

From the above table it is clear that out of the 64 scientists, 21 (32.81%) have knowledge of foreign language other than English.

4.4   Rubber Scientists Vs Type of Information Sources

The purpose of the question on the sources of information was to know the sources to which the user has access, and from where he normally obtain the needed information. Of the 13 sources of information listed, they were requested to mark the sources as well as to indicate the order of preference of the sources of information. The questionnaire helped in arriving at a conclusion about the exposure to the sources of information the scientists have had.

It is found that the scientists - Deputy Directors, Rubber Chemists, Plant Pathologists, Plant Physiologists, Botanists, etc. and Research Assistants - have varying preferences with regard to the use of information sources.

The data reveals that all the three groups prefer to read current periodicals as the most important source of information. The Deputy Directors, Rubber Technologists, Botanists, Plant Pathologists, Soil Chemists and others' second preference is to read the backvolumes of periodicals whereas Research Assistants' second preference is books. The third preference of Deputy Directors' is books whereas Rubber Technologists, Plant Physiologists and others' is Conference Proceedings. The third preference of Research Assistants' is backvolumes of periodicals.

Information Needs and Use Pattern of Rubber Scientists

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A study was conducted on the information needs and use pattern of scientists utilising literature on rubber at the Rubber Research Institute of India. Questionnaire method was followed which covered 78% of the scientists and technologists of the Rubber Board. Use pattern of different types of materials, adequacy of library collection and services, information strategy and related aspects were examined. The observations indicate that there is a need to expand the library services in areas like procurement of journals in foreign languages, bridging of gaps in titles, organising user education programmes and build up of dissertations/theses and also introduction of modern service gadgets.

0 INTRODUCTION

Progress of modern society depends, a great deal, upon the provision of the right kind of information in the right form at the right time. As information is valuable, it must be put to proper use. In order to serve the users efficiently and effectively, one must ascertain the needs of users in terms of information requirements.

Special libraries have been recognized to be the information disseminators of scientific and technological development. The functions of the special library are to select, evaluate, organize, and disseminate specialized information as soon as they are available. In a special library, the needs of the users vary according to the nature and levels of specialisation. Systematically ascertaining the needs of the users is therefore a key element. Therefore understanding the information needs as well as use pattern and making available the information to the users appropriately are very essential.

Librarians are becoming increasingly aware of the needs to study users as a means of making more informed decisions about library services. Such studies seem more relevant when precious library budgets have to be stretched as far as they could be. User studies have now been well accepted and are performed by various methods. There is considerable accumulation of literature in user studies and more and more

is being generated. The main objectives of user study are :—

1. To judge the limitations of library system and services.

2. To exploit resources at the least expenses of money, time and energy.

3. To enhance the quality of acquisition and collection.

4. To improve the science communication system.

1 RELEVANCE OF THE STUDY

The Rubber Research Institute of India (RRII) — the Research department of the Rubber Board — was established in 1955 at Kottayam. There are two experiment stations attached to the institute, one at its headquarters and the other Central Experiment Station at Chethackal, fifty km. away. The institute has Regional Research Stations in Tripura, Assam, Meghalaya, Maharashtra, Orissa, Madhya Pradesh, Tamil Nadu, Karnataka and Mizoram. The institute has a Library and Documentation Centre at its Headquarters, with a collection of 34645 volumes of books and bound journals covering the various subjects of interest to the organisation. The library maintains a fairly good stock of standards, preprints/reprints, photocopies, microforms and other documents, and receives around five hundred periodicals. As part of documentation and information services, the library issues information bulletins like documentation lists, Rubber alerts. Recent Additions, newsclipping services, SDI services etc. The library also arranges to procure translation of articles and photocopies from other institutes. The library has a reprographic unit. Facilities and services of the library are also extended to planters, manufacturers and others connected with the industry and to students, research workers etc. of outside institutions.

No research organization can claim to promote research without the provision of adequate and well balanced collection of books and periodicals related to the research needs of the scientists and also without rendering a prompt and effective service to its research scholars. This paper gives a study of the information needs and use pattern of the scientists of the Rubber Research Institute of India. Among the scientists in the field of rubber research in India user studies, to understand their information needs and ascertain the use pattern, have not been conducted so far.

2 OBJECTIVES

The study was aimed at :

i) examining the users' approaches to information sources ;

ii) ascertaining the adequacy of collection and library services ;

iii) examining the nature of search for current information ;

iv) identifying the users' approaches to sources that are published in foreign languages ;

v) understanding the search strategy for obtaining references and

vi) understanding the users' awareness of services generated by the RRII.

3 METHODOLOGY

The study was conducted using the questionnaire method and data were collected from 64 scientists. Different variables viz language, types of information sources, na-

ture of the collection, search strategy etc. were taken into account for the analysis and interpretation of the data. In this study the users of the library refers only to research workers in this Institute.

4 OBSERVATIONS

4.1 Use pattern of foreign language materials

Out of the 64 respondents, 11 scientists have knowledge in French language and 5 each in German and Russian.

TABLE 1 *Foreign Language Knowledge*

Sl No.	Language	No. of Scientists	%	Rank
1	French	11	17.18	I
2	German	5	7.81	II
3	Russian	5	7.81	II

In other words, 32.81% of the scientists have knowledge of a foreign language other than English. Moreover, 25 other respondents had a preference to scan journals in Chinese, Indonesian, French and Spanish

languages. However, their requirement had to be met through translation services as detailed abstracts seldom accompany the titles.

4.2 Use pattern of different types of information sources

The data helped in arriving at a conclusion about scientists' exposure to sources of information and their choice. Major sources of information to scientists are books, reference books, periodicals, back volumes of periodicals, indexing/abstracting and reviewing periodicals, patents, standards, dissertations/theses, technical reports, reprints and photocopies, bibliographies, informal sources and formal sources. Of the 13 sources, scientists prefer to consult current periodicals as the most important source of information. The second and third preferences are back volumes of periodicals and books, respectively.

4.3 Adequacy of collection

The summary (Table 2) given below indicates the adequacy of collection in the library.

TABLE 2 *Adequacy of collection*

Sl. No.	Documents	Adequate %	Partially adequate %	Inadequate %
a	Books	50.00	39.06	10.94
b	Reference books	48.44	43.75	7.81
c	Current periodicals	59.37	25.00	15.63
d	Back volumes of periodicals	20.31	46.88	32.81
e	Indexing/abstracting reviewing periodicals	37.50	46.88	15.62
f	Technical reports	15.63	65.62	18.75
g	Conferences/seminar proceedings	25.00	46.87	28.13
h	Patents and standards	25.00	47.73	27.27
i	Dissertations/theses	1.64	21.31	77.05
j	Reprints and photocopies	16.39	44.26	39.35
k	Bibliographies	21.88	53.12	25.00

The data indicate the percentage of respondents in each category of documents available in the library. The analysis shows that for 40.63% users current periodicals and for 50% users books are not adequate enough to satisfy the requirement pertaining to their research work. A high percentage of inadequacy is felt in the case of dissertations/theses.

4.4 Search for current information

The following table gives the use pattern of current information by the rubber scientists.

TABLE 3   *Current information search*

Sl. No.	Sources	No. of scientists	%
a	Institute's current awareness services	2	3.13
b	Current periodicals	49	76.56
c	Indexing and abstracting periodicals	9	14.06
d	Discussions	..	..
e	Conferences	1	1.56
f	Seminars	..	..
g	Correspondence	2	3.13
h	Book trade catalogues and announcement bulletins	1	1.56

The table reveals that 76.56% scientists consult primary periodicals to keep abreast of current developments in their field of study. Their second source for current information is indexing/abstracting periodicals. Current awareness service bulletin and correspondence among scientists constituted their third choices.

4.5 Search strategy

The search strategy followed by scientists for obtaining references about a specific topic is given in table 4.

TABLE 4   *Search strategy for obtaining references*

Sl. No.	Search Method	No. of scientists	%	Rank
a	By scanning through the issues in the Library	44	72.13	I
b	Through indexing/abstracting or reviewing periodicals	10	16.39	II
c	Through local documentation list prepared and circulated by the library	7	11.48	III

On examining the search strategy of scientists for obtaining references, 72.13 percent users expressed that they obtain information by scanning through the various issues of periodicals directly. 16.39 percent of users obtain information through indexing/abstracting or reviewing periodicals whereas 11.48 percent of users get their information through local documentation lists prepared and circulated by the library.

From the above data it is clear that the documentation lists produced by the library are not utilized by the scientists at the desired level. Apparently there is an apprehension that the documentation lists do not cover all periodicals. Naturally the coverage is restricted to periodicals received in the library. Even in the journals covered, only abstracts/titles directly related to rubber are included. In science and technology which is dynamic and progressing very rapidly, wider coverage in related crops/ aspects is vital. However extraordinary growth in the number of technical and scientific publications makes it almost impossible for even specialized libraries to include complete titles/abstracts of all journals in any subject, in the documentation list. This can be accomplished partly by circulating the contents page of the relevant

periodicals in the form of photocopies and partly by user education programmes. Simultaneously improvements in the documentation lists can also be attempted to cover the complete range of journals available and to incorporate titles in connected fields.

4.6 Use habits of services

The following table (Table 5) provides the use habits of services generated from the library.

TABLE 5 *Use habits of library services*

Sl. No.	Services	No. of scientists	%	Rank
a	Fact finding service	8	4.9	VI
b	Referral service	21	12.80	IV
c	Latest addition list of books	36	22.00	II
d	Reprography services	49	30.06	I
e	Interlibrary lending service	3	1.80	VII
f	Newspaper clipping service	21	12.80	IV
g	Current content service	25	15.30	III
h	SDI service	1	0.61	VIII
i	Translation service	15	9.20	V

The data reveals that 30.06 percent of scientists utilize reprographic services. The second familiar service utilized by the scientists is latest addition list of books generated by the RRII library. Current contents service attracts the users as their third familiar service. SDI service is the least familiar one among scientists.

5 SUGGESTIONS AND CONCLUSION

The following conclusions/suggestions emerge from the study :

i) Use of journals in foreign languages other than English is comparatively less. At the same time scientists are aware that valuable literature are available in such journals. To meet this demand local translation services can be attempted.

ii) Higher priority assigned to periodicals iustified by the findings and it must be continued. As periodical literature deserves greater importance, existing gaps in certain titles are to be filled up.

ii) It is found that the secondary periodicals are underutilized. For the effective utilization of these time saving tools, user education programmes may be organised.

iv) The documentation centre has the greatest responsibility in the quick dissemination of information between the author and the user. The effective utilization of published information can remarkably be enhanced by the circulation of 'Current Contents'.

v) Inadequacy of documents is felt in the area of dissertations/theses. Acquisitions of these types of materials are to be improved to satisfy the needs of the scientists.

vi) It is found that the present system of services provided to the rubber scientists by the RRII library is inadequate. Introduction of sophisticated services by using modern gadgets like computers is a timely demand. Such services can have maximum exploitation of re-

sources for scientific and techno-
logical advancements.

vii) The institute has a leading role to
play in improving the bibliographi-
cal organization of literature. The
prospective librarians have to act as
filters between recorded knowledge
and the users in an effort to pro-
vide improved quality of services
to the clientele. The study carries
wider implications to the over all
design and improvement of library
services.

ACKNOWLEDGEMENT

The first author is grateful to Dr. M. R.
See huraj, Director, Rubber Research Insti-
tute of India for permission for publication
of this paper and also to Dr. A. O. N.
Panikkar, Joint Director for his keen interest
in going through the draft, valuable sugges-
tions and encouragement.

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From the above it can be inferred that current periodicals is the most favourite information source to meet the needs of the researchers. The second and third preferences of information sources are backvolumes of periodicals and books respectively.

The general order of priority recognised in the use of sources are the following:

i)   Current Periodicals

ii)   Backvolumes of periodicals

iii)   Books

iv)   Indexing/Abstracting and reviewing periodicals

v)   Conference/Seminar proceedings

vi)   Reference books

vii)   Technical Reports

viii)   Reprints and photocopies

ix)   Bibliographies

x)   Informal Sources

xi)   Formal sources

xii)   Dissertations/Theses

xiii)   Patents and standards

4.5   Journal Use pattern

Through another question, scientists were asked to list the periodicals in their field of interest which are subscribed by the RRII Library, and frequently used by them in the order of

preference so as to prepare a list of core journals. The result of the analysis is given in Table number 4.

Table 4   Journal Use Pattern

Name of the Journal	No. of persons	Rank No
Rubber Chemistry and Technology	9	I
Journal of the Natural Rubber Research	8	II
Plant Physiology	4	III
Agronomy Journal	3	IV
Phytopathology	3	IV
Plant Disease	2	V
Indian Journal of Entomology	2	V
Journal of Biochemistry	2	V
Elastomerics	2	V
Planters Bulletin	2	V
Rubber Board Bulletin	2	V
Agricultural Economics	1	VI
American Journal of Botany	1	VI
Annals of Botany	1	VI
Agricultural and Forest meteorology	1	VI
Canadian Journal of Microbiology	1	VI
Communications in Soil Science and Plant analysis	1	VI
Cytologia	1	VI
Economic and Political Weekly	1	VI
Electrical India	1	VI
Environmental Pollution	1	VI
Indian Journal of Agricultural Research	1	VI
Indian Journal of Microbiology	1	VI
Indian Phytopathology	1	VI
International Pest Control	1	VI

Journal of Experimental Botany	1	VI
Journal of Plantation Crops	1	VI
Journal of Rubber Research Institute of Sri Lanka	1	VI
Journal of the Indian Institute of Soil Science	1	VI
In Vitro	1	VI
NR Technology	1	VI
Plant Cell and Environment	1	VI
Plant Pathology	1	VI
Polymer	1	VI
Soil Science Society of America Journal	1	VI
Wood Science and Technology	1	VI

From the table it is clear that the most favourite journal among scientists is Rubber Chemistry and Technology. Out of the 64 scientists, 9 scientists prefer to read the same. Journal of Natural Rubber Research which is ranked as the second is preferred by 8 scientists. Plant Physiology which is preferred by 4 scientists goes to third position.

The above analysis brings to light the specific subject of the journal and the specific area of research scientists are more or less coinciding with each other. Besides, majority of the journals they prefer to read are those published in developed countries. Indian Journal of Entomology has got only fifth position in their preference.

4.6 Use Pattern of Indexing/Abstracting Journals

The scientists were asked to list a few essential titles of indexing/abstracting journals in the order of preference. The tabulated data does not seem to be encouraging. The total respondents in this case is only 50 (i.e. 78.13%).

Table 5   Use pattern of Indexing/Abstracting Journals

Total Scientists 64   Total Response   50

Name of Indexing/Abstracting Journal	Preferences			Rank No
Biological Abstracts	7	10	11	I
Review of Plant Pathology	7	2	..	II
Chemical Abstracts	6	5	1	III
Rapra Abstracts	6	5	..	IV
Plant Breeding Abstracts	5	2	1	V
Soils and Fertilizers	4	1	..	VI
Crop Physiology Abstracts	3	1	1	VII
Review of Applied Entomology	2	2	..	VIII
Current Advances in Plant Science	2			IX
Horticultural Abstracts	.	9	11	
Abstracts on tropical agriculture	.	4	2	
Current Contents	.	3	.	
Agronomy Abstracts	.	3	.	
Applied Botany Abstracts	.	.	1	
Indian Science Abstracts	.	.	1	
Weed Abstracts	.	.	1	

The table 5 shows that 7 scientists have preferred Biological Abstracts as the first preference and 10 scientists as their second preference and 11 scientists as their third preference. Similarly, Review of Plant Pathology is chosen as the first preference by 7 scientists and 2 scientists preferred it as the second choice. Chemical Abstracts and Rapra Abstracts have been chosen as the first preference by 6 scientists and 5 have chosen these as second preference. Horticultural Abstracts have been chosen by 9 scientists as the second preference and 11 scientists as third preference. The least preferred abstracts are Applied Botany Abstracts, Indian Science Abstracts and Weed Abstracts.

14 Scientists indicated that they are not at all using the indexing/abstracting periodicals in the RRII Library.

4.7 Use of Foreign Periodicals among scientists

Among the users, 23.44% (i.e. 15 scientists) responded and they stated that they use foreign periodicals in the languages other than English and they prefer to read the journals viz. Chinese Journal of Tropical Crops, Menara Perkebunan, Pesquisa Agropecuaria Brasieliera, Bulletin Perkaretan, Revue Generale de Caoutcheque Plastiques, Fitopatologia Brasieliera, Revista Theobroma Phytopathologisch Zeitschrift etc.

4.8 Use of Microfiche/Microfilm

The analysis of data reveals that only negligible percentage (10.95%) of users are interested in using microfiche.

The majority of the scientists are not aware of the facility of using microfiche reader in the library.

4.91 Need for information sources that are not available in the RRII Library

The data reveals that 84.37 per cent scientists felt the need for the materials not available in the library occasionally, 9.38 per cent very frequently and 6.25 per cent never felt the need for materials·

Table 6   Need for information sources that are not available in the RRII Library

Frequency	No. of scientists	%
Very frequently	6	9.38
Occasionally	54	84.37
Hardly ever	4	6.25

From the above, it can be generalized that scientists are not satisfied with the present collection of materials in.the RRII Library.

4.92   Adequacy of Collection

The purpose of the question was to know the areas and extent of adequacy felt in respect of the various forms of documents. Here the questionnaire helped to arrive at a point as to in which form of documents the adequacy and inadequacies are felt.

Table 7 Adequacy of Collection

Sl. No.	Category of Documents	Adequate %	Partially adequate %	Inadequate %
a	Books	50	39.06	10.94
b	Reference Books	48.44	43.75	7.81
c	Current Periodicals	59.37	25.00	15.63
d	Backvolumes of Periodicals	20.31	46.88	32.81
e	Indexing/Abstracting/ Reviewing Periodicals	37.5	46.88	15.62
f	Technical Reports	15.63	65.62	18.75
g	Conferences/Seminar Proceedings	25.00	46.87	28.13
h	Patents and Standards	25.00	47.73	27.27
i	Dissertations/Theses	1.64	21.31	77.05
j	Reprints and Photocopies	16.39	44.26	39.35
k	Bibliographies	21.88	53.12	25.00

The above table shows that current periodicals are more adequate than the other forms of documents. 59.37 per cent of users expressed that current periodicals are adequate. Next category of documents in which adequacy is felt (i.e. 50%) are books.

Technical Reports are partially adequate to 65.62 percent users. Bibliographies are partially adequate to 53.12 percent users where as backvolumes of periodicals and indexing/abstracting/reviewing periodicals are partially adequate to 46.88 per cent users.

A high rate of inadequacy is felt in the case of dissertations/ theses i.e. 77.05 per cent. The inadequacy is felt very high in the case of Reference Books.

According to the opinion of a negligible percent of scientists, dissertations/theses are adequate. However, 77.05 per cent felt inadequacy in this case. So the collection of these materials are to be improved to satisfy the needs of the clientele of the library. The other forms in which inadequacy is felt among users are reprints and photocopies, patents and standards, backvolumes of periodicals etc.

4.93 Collection of documents

In response to a question regarding the balanced collection of documents in the library, 57.81 per cent of the scientists have the opinion that there is a balanced collection of documents in RRII Library.

However, from the above it is to be noted that the collection of documents are yet to be improved so as to balance with the needs of the entire scientists. The areas in which the collection is not enough are to be found out and the documents are to be procured in those areas.

4.94 Current Information Search

The data pertaining to the nature of search carried out by the rubber scientists in getting current information in their field of research is analysed. The data is given in Table No.8.

Table 8   Current Information Search

Sl. No.	Sources	No. of Scientists	%
a	Institute's Current Awareness Service	2	3.13
b	Current Periodicals	49	76.56
c	Indexing and abstracting periodicals	9	14.06
d	Discussions	..	..
e	Conference	1	1.56
f	Seminars	..	..
g	Correspondence	2	3.13
h	Book trade catalogues and announcement bulletins	1	1.56

8 sources of information were listed and only 3 preferences were taken for the analysis of data. 49 scientists (76.56%) expressed that they consult primary periodicals to keep abreast of current developments in their field of study. Their second (14.06%) source for current information is indexing and abstracting periodicals. The current awareness service and correspondence among scientists constituted their third choices.

From the above table, it is found that the scientists are not often using discussion, conferences and seminars etc. for the purpose of knowing current developments in the field of their subject.

Periodicals contain current information and these are very important in the field of research to get the current developments in the subject field. Among the 64 scientists responded, only 3.23 per cent are aware of Institute's current awareness services. Scientists have not given preference to discussions and seminars in their search for the current information.

4.95 Information search on a specific topic

In response to a question regarding the method of collecting information about a specific topic from the library, 43.75 per cent (i.e. 28 scientists) acquire information by searching the schelves by themselves, 25 per cent (i.e. 16 scientists each) through consulting the catalogue and by asking the librarian and only 6.25 per cent (i.e. 4 scientists) by discussion with colleagues.

Table 9   Information search on a specific topic

Sl. No.	Methods	No. of Scientists	%
a	Asking the librarian	16	25.00
b	Searching the shelves	28	43.75
c	Consulting the catalogue	16	25.00
d	Discussion with colleagues	4	6.25

The above table shows that the majority (43/75%) of scientists expressed their views that searching the shelves is the main approach for getting information on a specific topic. This is of course a time consuming one. By consulting the catalogue, more time can be saved. The bibliographical details are being entered in the computer now and by the use of this, the consultation is very easy and the materials can be located easily.

4.96 Search strategy for obtaining references

The search strategy of scientists for finding out information regarding articles in the periodicals is examined. In this case, 72.13 per cent (i.e. 44 scientists) users expressed that they obtain information by scanning through the issues of periodicals for obtaining references.

Table 10   Search Strategy for obtaining references

Sl. No.	Search Method	No. of Scientists	%	Rank
a	By scanning through the issues in the library	44	72.13	I
b	Through indexing/abstracting or reviewing periodicals	10	16.39	II
c	Through local documentation list prepared and circulated by the library	7	11.48	III

16.39 per cent users expressed that they obtain information by going through indexing, abstracting or reviewing periodicals whereas 11.48 per cent (i.e. 7 scientists) by going through local documentation lists prepared and circulated by the library. This may be due to lack of proper user instruction in the use of information sources especially *secondary periodicals*.

From the data, it is also clear that the scientists are not utilizing the documentation lists of the library in the desired level. In the present context of information explosion, most of the scientific literature are produced in any field in the form of journal articles. Scientists do not get time to go through all the journals published in their subject. Tho indexing/abstracting periodicals will help the scientists to save time. The documentation lists prepared and circulated by the library will also be helpful in saving the time of scientists.

4.97 Literature Search

The question was regarding if the scientists felt any difficulty in conducting a comprehensive literature search in connection with their research work. Nearly 55 per cent scientists do not find any difficulty in conducting a literature search. 45 per cent users find difficulty in this regard. The main difficulty they have pointed out are:

a) Inadequacy of books

b) Inadequacy of periodicals

c) Inadequacy of backvolumes of periodicals

d) Inadequacy of theses

e) Lack of display of new arrivals; and

f) Lack of Catalogue

From the professional point of view most of the problems are related to the inadequacy of materials and bibliographical control of available literature in the RRII library. By library automation and proper technical organization, the aforesaid problems can be solved to a certain extent.

4.98   Use habits of Lbirary services

The question relating to the utilization of services provided by the library, listed under 9 heads like fact finding service, referral service, latest addition list of books, reprography services, inter-library lending service, newspaper clipping service, current contents service, SDI service and translation service.

The aim behind this question was to understand the awareness about the availability of these services among scientists.

The analysis of data reveals that 30.06 per cent (49 scientists) utilize reprography services. The second familiar service utilized by the scientists is latest addition list of books generated by the RRII Library. Current contents service attracts the users as their third familiar service. SDI service is the least familiar one among scientists.

Table 11 Use habits of Library Services

No.	Services	No.of scientists	%	Rank
a	Fact finding service	8	4.9	VI
b	Referral Service	21	12.8	IV
c	Latest addition list of books	36	22.00	II
d	Reprography services	49	30.06	I
e	Interlibrary lending service	3	1.8	VII
f	Newspaper clipping service	21	12.8	IV
g	Current Content service	25	15.3	III
h	SDI Service	1	0.61	VIII
i	Translation Service	15	9.2	V

4.991 Use of services generated from other agencies and centres

The users' awareness of services generated by the various external agencies and centres is also examined. 67.19 per cent (i.e. 43 scientists) are not utilizing the services from the above centres. Only 15 scientists (23.43%) are making use of the services from INSDOC, New Delhi; 11 scientists (17.19%) the services of IARI, New Delhi; 5 scientists (7.81%). Informatics, Bangalore and 4 scientists (6.25%) use National Centre for Scientific Information, Bangalore.

Majority of the scientists are not aware of the services from the centres mentioned above. Those who are aware of the services are making use of reprography services and translation services only.

4.992 Adequacy of library services

Irresective of the category of users, 39 per cent scientists' opinion is that the library services in the RRII Library are adequate

whereas 59.38 per cent found it partially adequate and 1.56 found it highly inadequate.

4.993 Frequency of visit to the Library Vs Rubber Scientist

The purpose of the question was to understand the user behaviour i.e. to know the frequency of scientists' visit to the library.

Table 12 Frequency of visit to the library

No.	Frequency	No. of Scientists	%
1	Several times a day	2	3.13
2	At least once a day	27	42.19
3	At least once a week	26	40.62
4	Occasionally	9	14.06

From the above table, it is seen that the majority of scientists (42.19%) visit the library at least once a week, 14.06 per cent occasionally and 3.13 per cent several times a day.

4.994 Use habit in respect of time spent in the library Vs scientists

The time spent in the library by the scientists vary from minutes to hours a day. 58 per cent scientists expressed that they spent about 2 hours during each visit to the library whereas 24.1 per cent spent 1 hour, 11.2 per cent spent about 3 hours, 3.2 per cent spent 4 hours and 1.6 per cent spent 5 to 6 hours a day during each visit to the library.

4.995 Relative time spent in the library

In this question, scientists were asked to write the proportion of the total time spent in the library for searching for documents, searching for specific information, for reading subject books and notes taking, for reading articles in subject periodicals, for reading recreation materials like novels and for reading newspapers and popular journals.

The data reveals that scientists spend the maximum time i.e. 33 per cent of the total time spent in the library for reading articles in subject periodicals. Second preference, they give for reading subject books and notes taking, i.e. 23 per cent of the total time. For searching for specific information, 19.45 per cent of the total time, and for searching for documents 10 per cent time, for reading newspapers and popular journals 9.05 per cent time and for reading recreation materials, they spent only 5.50 per cent of the total time.

From the above, we can infer that scientists spent more time for reading articles in subject periodicals and for reading subject books and notestaking.

CHAPTER V

INFORMATION NEEDS AND USE PATTERN OF RUBBER SCIENTISTS:
ANALYTICAL APPROACH THROUGH CITATION METHOD

5.0 <u>Introduction</u>

Citations are the bibliographic details of documents used in the preparation of a book, or a paper, or any other scholarly work. Citation analysis is the "analysis of citations or references which form part of the scholarly apparatus of primary communication."[1] 'True' citation analysis is one which deals with works cited having actually been used in preparation of, or having otherwise contributed to the source paper.[2] Broadus calls the cited documents as "source publications."

Citation study is one of the effective methods to understand the information requirements of the readers. The growth of publications, the cost of documents, multidisciplinary nature of research, the varied nature of the requirements of users etc. are forcing librarians to think of quantitative techniques for decision making purposes.

Citation method is used in the present study to understand the information needs and use pattern of the scientists in the RRII. This method is used in order to corroborate the findings arrived through questionnaire method.

The major objective of the analysis of data here is to under-
stand the characteristics of use of materials as cited in the scientific
papers of rubber scientists. More specifically this is attempted to
identify;

a) Subject analysis of papers;

b) Average citation rate;

c) Most cited authors;

d) Rate of self citation;

e) Type of documents used;

f) Most cited periodicals;

g) Median age of citations used; and

h) The languages of the materials used.

Citations were collected from 64 available scientific papers
published during 1980-88. These include documents such as journal
articles, books, technical reports, conference proceedings, theses,
patents and standards etc. 779 citations were collected from the above
sources.

5.1 ANALYSIS

For the analysis of the collected data, the variables like
subject, types of materials, year etc. were taken into account. The
data collected through the citation method is analysed and interpreted
under the following heads.

5.11 Subject analysis of scientific papers.

The scientific papers were first analysed subject-wise to know the specific subject areas in rubber where the research activities are more concentrated. It is seen that the scientific papers dealt with the various aspects relating to rubber such as agricultural, botanical, technological and economic aspects. This finding is in tune with the finding arrived through the questionnaire method.

5.12 Year-wise distribution of Papers.

Out of the papers, 32.81 per cent papers are published in 1980 and 21.87 per cent papers in 1988. The number of papers published in the years 1982 and 1983 are comparatively less in numbers.

Table 13   Year-wise distribution of papers

Year	No. of papers	Percentage
1980	21	32.81
1981	6	9.38
1982	ι 2	3.12
1983	2	3.12
1984	8	12.51
1985	3	4.69
1986	3	4.69
1987	5	7.81
1988	14	21.87

5.13 Range of citations.

Citation rate is defined as the number of items cited. According to Eugene Garfield, citation rate of a journal can be calculated in a number of ways.[3]

i) It can consist of all reference to the cited journal with even duplicate references from the same source article counting as seperate citation links.

ii) It can be the number of source articles citing the journal.

iii) It can also be done by counting the number of source articles citing different articles of the cited journal seperately.

The method given under item No, 3 above, was used for getting range of citation in this study. It was observed that range of citations varies from minimum of 2 to the maximum of 66. Hence the average number of citations came to 12.

5.14 Type of documents cited

The data given in Table Number 14 clearly shows that journal articles (63.67%) were the most favoured source of information among rubber scientists. Books and Conference Proceedings occupy the second and third positions respectively. But theses (0.90%) and patents and standards (1.03%) are the least used sources by Rubber Scientists. The distribution ot types of materials cited is also represented in Fig.3.

TYPE OF DOCUMENTS CITED

☐	JOURNAL ARTICLES
▨	CONFERENCE PROCEEDINGS
▦	THESES
▨	PATENTS/STANDARDS
▨	ANNUAL REPORTS
▨	BOOKS
▨	OTHERS
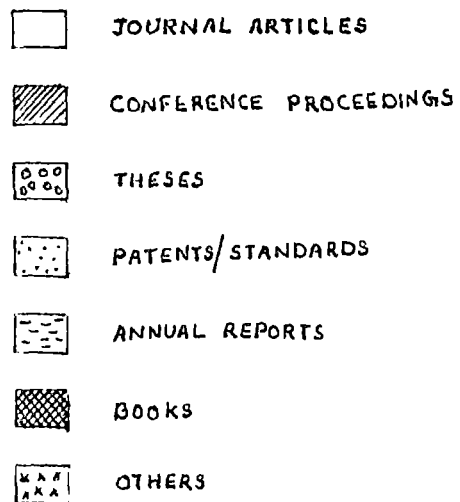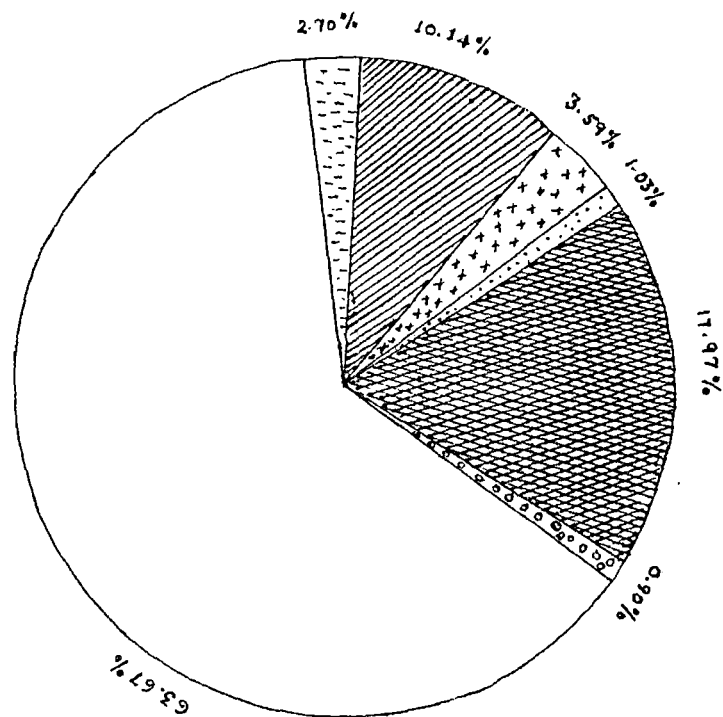
FIGURE 3

Table 14   Distribution of Type of Documents

Sl. No.	Type of Documents	Total No. of citations	%	Rank
1.	Journal articles	496	63.67	I
2.	Books	140	17.97	II
3.	Conference Proceedings, Symposia	79	10.14	III
4.	Annual Reports	21	2.70	IV
5.	Patents and standards	8	1.03	VI
6.	Theses	7	0.90	VII
7.	Others (includes Circulars, news letters, etc.)	28	3.59	V

From the above analysis, it can be inferred that the scientists in the Rubber Research Institute of India use journal articles more than any other types of documents. It is also substantiating the finding arrived through questionnaire method.

5.15 Most cited periodicals

Journal citation studies have been increasingly used as a means to measure the utility of journals.

The present study also attempted to identify the most heavily used journals by scientists. Rank list of cited periodicals given n the table No. 15 throws much light on this aspect.

Table 15   Most cited Periodicals

Sl.No	Name of Journal	Number of times cited	Rank
1.	Planters Bulletin	66	I
2.	Rubber Board Bulletin	61	II
3.	Journal of Natural Rubber Research	53	III
4.	Journal of RRISL	20	IV
5.	Cytologia	10	V
6.	Transactions of IRI	9	VI
7.	Indian Journal of Agricultural Sciences	7	VII
8.	Revue Genrale de Caoutchoucs et Plastiques	6	VIII
9.	Crop Science	5	IX
10.	European Rubber Journal	5	IX
11.	Indian Journal of Entomology	5	IX
12.	Planter	5	X
13.	Rubber Chemistry and Technology	5	X
14.	Arch. Rubber Culture	4	XI
15.	Chinese Journal of Tropical Crops	4	XI
16.	Journal of Plantation crops	4	XI
17.	Nature	4	XI
18.	Agricultural Journal of India	3	XII
19.	American Journal of Botany	3	XII
20.	Fertilizer News	3	XII
21.	Indian Journal of Agricultural Economics	3	XII
22.	Indian Phytopathology	3	XII
23.	NR Technology	3	XII
24.	Pesticides	3	XII
25.	Planters Chronicle	3	XII
26.	Rubber developments	3	XII
27.	Science	3	XII
28.	Archives of Biochemistry and biophysics	2	XIII

29.	Advances in Agronomy	2	XIII
30.	Bee World	2	XIII
31.	Biochemical Journal	2	XIII
32.	Botanical Review	2	XIII
33.	Current Science	2	XIII
34.	Genetica	2	XIII
35.	Indian honey	2	XIII
36.	Journal of Polymer Science	2	XIII
37.	Journal of Root Crops	2	XIII
38.	Journal of the Indian Botanical Society	2	XIII
39.	Madras Agricultural Journal	2	XIII
40.	Physiologia Plantarum	2	XIII
41.	Phytopathology	2	XIII
42.	Acta biology belg	1	XIV
43.	Advances in Enzymology	1	XIV
44	Agricultural Research	1	XIV
45	American Naturalist	1	XIV
46.	Annals of Botany	1	XIV
47.	Annals of Royal Botanical Garden	1	XIV
48.	Archiv fur microbiologie	1	XIV
49.	Australian Journal of Botany	1	XIV
50.	Ber dt sch bolbres	1	XIV
51.	Biblio Genetics	1	XIV
52.	Biochemistry	1	XIV
53.	Biochimica biophysica acta	1	XIV
54.	Biometrics	1	XIV
55.	Boden Luthyg	1	XIV
56.	BPP medan	1	XIV
57.	Bragantia	1	XIV

58.	Brueness biograph	1	XIV
59.	Bulletin of entromogical research	1	XIV
60.	Bulletin of INTNEAC	1	XIV
61.	Bulletin of Meschan	1	XIV
62.	Canadian J Bot.	1	XIV
63 ·.	Canadian J Plant Sc.	1	XIV
64.	Canadian J Research	1	XIV
65.	Euphytica	1	XIV
66.	Hort Science	1	XIV
67.	Indian Bee Journal	1	XIV
68.	Indian Cashew	1	XIV
69.	Indian Journal of Plant Physiology	1	XIV
70.	Indian sugar	1	XIV
71.	Industrial Engg Chemistry	1	XIV
72.	Japan Jl Breeding	1	XIV
73.	Journal of Applied Ecology	1	XIV
74.	Journal of Applied polymer Sc.	1	XIV
75.	Journal of American Chemical Society	1	XIV
76.	Journal of bacteriology	1	XIV
77.	Journal of biological Chemistry	1	XIV
78.	Journal of Chemical education	1	XIV
79.	Journal of Experimental Botany	1	XIV
80.	Journal of Heredity	1	XIV
81.	Journal of nat Cancer institute	1	XIV
82.	Malayan Economic Review	1	XIV
83.	Menara Perkebunan	1	xiv
84.	New Botanist	1	XIV
85.	New Phytologist	1	XIV
86	PANS	1	XIV
87.	Physiologia Plantarum	1	XIV
88.	Phytochemistry	1	XIV

89.	Plant Physiology	1	XIV
90.	Plant Potection bulletin	1	XIV
91.	Polymer Age	1	XIV
92.	Potash Research	1	XIV
93.	Proceedings of the Royal Society	1	XIV
94.	Rubber	1	XIV
95.	Rubber and Plastics news	1	XIV
96.	Rubber news	1	XIV
97.	Rubber Statistical bulletin	1	XIV
98.	Rubber Recil	1	XIV
99.	Rubber World	1	XIV
100	Soil Science	1	XIV
101.	Soil Science Society of America Jl	1	XIV
102.	Sorghum newsletter	1	XIV
103.	Stain Technology	1	XIV
104.	Theoretical and applied genetics	1	XIV
105.	Tobacco news	1	XIV
106	Tropical pest management	1	XIV

Table Number 15 clearly shows that 'Planters Bulletin' is the most productive journal in respect of citations. 'Rubber Board Bulletin' ranks second whereas 'Journal of Natural Rubber Research' goes to third position.

'Planters Bulletin' and 'Journal of Natural Rubber Research' are published by the Rubber Research Institute of Malaysia. 'Rubber Board Bulletin' is published by the Rubber Board, Kottayam.

89.	Plant Physiology	1	XIV
90.	Plant Potection bulletin	1	XIV
91.	Polymer Age	1	XIV
92.	Potash Research	1	XIV
93.	Proceedings of the Royal Society	1	XIV
94.	Rubber	1	XIV
95.	Rubber and Plastics news	1	XIV
96.	Rubber news	1	XIV
97.	Rubber Statistical bulletin	1	XIV
98.	Rubber Recil	1	XIV
99.	Rubber World	1	XIV
100	Soil Science	1	XIV
101.	Soil Science Society of America Jl	1	XIV
102.	Sorghum newsletter	1	XIV
103.	Stain Technology	1	XIV
104.	Theoretical and applied genetics	1	XIV
105.	Tobacco news	1	XIV
106	Tropical pest management	1	XIV

Table Number 15 clearly shows that 'Planters Bulletin' is the most productive journal in respect of citations. 'Rubber Board Bulletin' ranks second whereas 'Journal of Natural Rubber Research' goes to third position.

'Planters Bulletin' and 'Journal of Natural Rubber Research are published by the Rubber Research Institute of Malaysia. 'Rubber Board Bulletin' is published by the Rubber Board, Kottayam.

Availability of these journals are also checked ⌘with the holdings of RRII. Of the 106 journals, only 70 are being subscribed.

5.16 Most Cited authors

An analysis has also been done to study the most frequently cited authors of the scientific publications. Shri P.N.Radhakrishna Pillay, who was the Joint Director of Research in the Rubber Research Institute, received the highest count of citations (i.e.20 times) for his contributions. Smt. C.K Saraswathy Amma (Cytogeneticist) and Smt. L.Thankamma (Mycologist) received second rank in respect of cited authors.

5.17 Most cited books

An analysis has also been done to study the most frequently used book by rubber scientists. As found in the general sequence, "Hevea: Thirty years of research in the Far East" by M.J.Dijkman received the highest count of citations. "Manual of Rubber Planting" by A.T.Edgar were cited frequently which ranked second.

5.18 Rate of self citation.

Citation to one's own previous works are known as self citations. But in this study, total self citations counted was only 39.

5. 191 Use of foreign language documents

It is found that no foreign language documents other than English is used by the scientists. It is also observed that English language documents are used more when compared to other languages. It is also noted that only 16 journals published from foreign countries are used by the rubber scientists.

5.192 Distribution of citations in different periods.

From the above table (table No. 16) it could be found that there is nearly a steady increase in the number of citations from 1950 to 1980s. Only 80 citations were recorded to pre 1950 period. The major portion of the citations (36.71%) falls within the period 1970 to 1979. The median age of citation is calculated. The median age of citation of literature on rubber is 9 years. Year-wise distribution of citations is also represented in Figure. 4.

Table 16   Year-wise distribution of citation

Year	Number of citations	Percentage
Before 1950	80	10.27
1951 - 1959	73	9.37
1960 - 1969	221	28.37
1970 - 1979	286	36.71
After 1980	119	15.28

SCALE ON Y-AXIS - 1 CM = 20 CITATIONS

DISTRIBUTION OF JOURNAL CITATIONS IN DIFFERENT PUBLICATIONS OF CITED ARTICLES
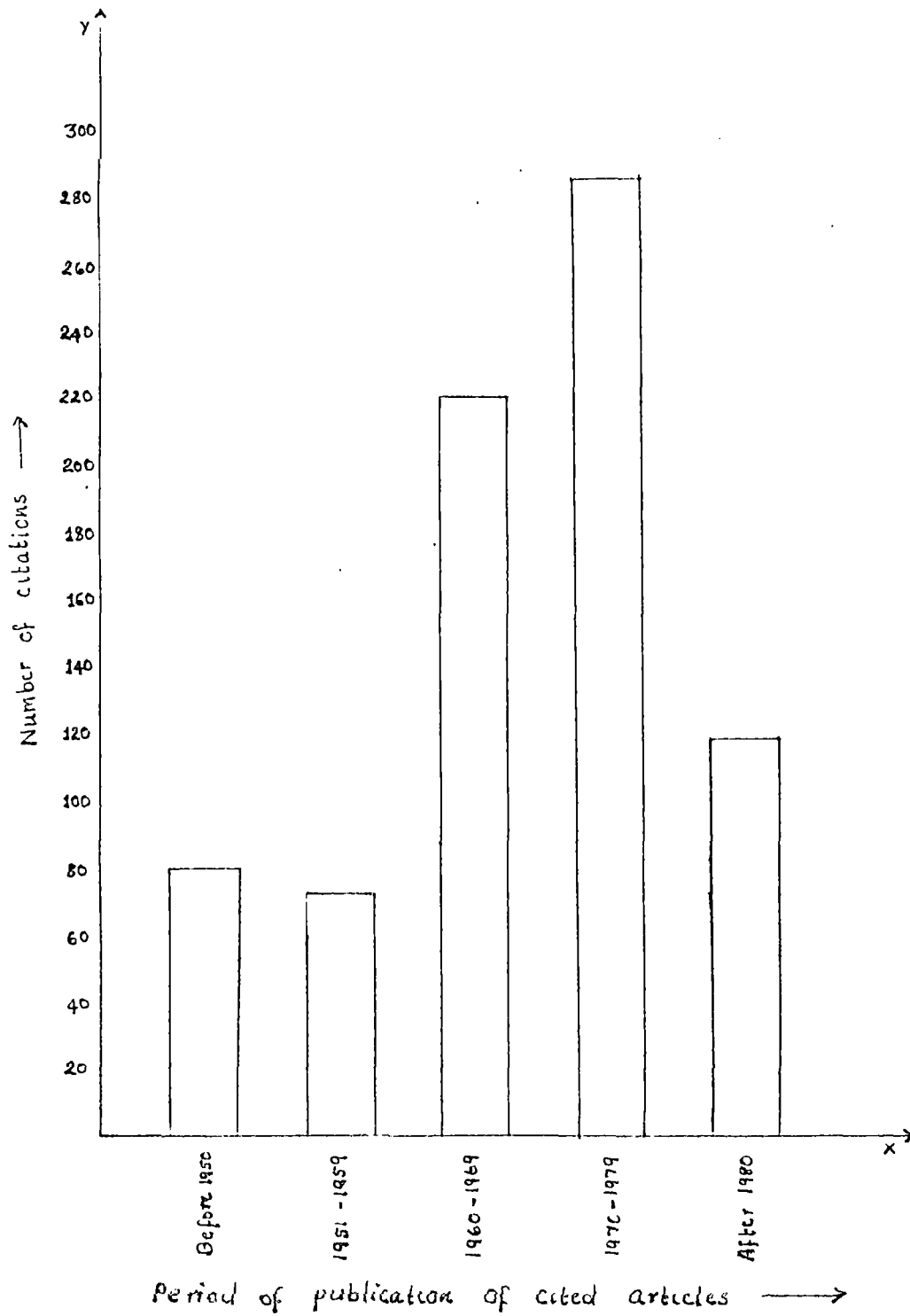
FIGURE 4

5.2 CONCLUSION

By the analysis of citations appearing in those source documents it is possible to identify the most used and important contributions in a specific subject field. Libraries may experience a continued decline in the annual budget allotment. Librarians will have to make practical decisions regarding the acquisition policies, their proper organization for better use and cancellation of the unused periodicals This can be done only by understanding the information needs of the scientists. It is hoped that the data collected for this study and analysis will provide a basis for practical decision making for better acquisition and organization of documents in the RRII Library. An objective approach to the results of these use pattern studies will help to provide better service to library patrons more economically.

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CHAPTER VI

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Analysis of the data collected during the investigation has revealed very useful information. The results of the study have been discussed in detail in the analysis part of the work. However, a brief summary of important findings evolved from the study are grouped below.

6.1 Subject specialisation

Irrespective of the category of users the majority (20.3%) of Rubber Scientists are interested in the subject areas in Rubber Chemistry and Technology and Plant Pathology. The second preference (17%) goes to Botany and the third preference (12.5%) to Plant Physiology and Agriculture. The least preference is given to Agrometeorology and Biotechnology.

6.12 Foreign language proficiency

Among the 64 respondents, 21 scientists (32.81%) have proficiency in foreign languages like German, Russian and French. Among the users of foreign periodicals, 23.44% responded and they use foreign periodicals other than English. In the citation study, it is seen that the scientists had used 22 foreign journals other than English (i.e. 19.6%) for writing scientific papers.

6.13 Types of Information Sources Vs Rubber Scientists

Regarding the use of different sources of information, Deputy Directors; Rubber Technologists, Plant Pathologists, Plant Physiologists, Botanists, etc.; and Research Assistants prefer to read current periodicals as the most important source of information. The second preference, of the first two groups (Deputy Directors and Rubber Technologists) is backvolumes of periodicals whereas the third group (Research Assistants) prefer books. The Deputy Director's third preference is books, whereas Technoligists, Plant Physiologists etc. prefer Conference Proceedings and that of Research Assistants' is backvolumes of periodicals. Patents and standards are underused.

In the citation study also journal use is rated as the highest. The population in this study are active researchers and this fact also emphasize the usefulness of journal literature to them.

'Rubber Chemistry and Technology' is the most favourite journal among rubber scientists. The second preference is to 'Journal of Natural Rubber Research' and third preference to 'Plant Physiology'.

Citation study indicates that 'Planters Bulletin' is the most productive journal which has been cited 66 times. 'Rubber Board Bulletin' and 'Journal of Natural Rubber Research' are ranked as second and third positions respectively.

The most favourite abstracting journal among the scientists is 'Biological Abstracts'. The least preferred are 'Weed Abstracts'

and 'Applied Botany Abstracts'. Citation study could not yield data on the use of these second sources.

The majority of rubber scientists (89.05%) are not using microfiche. This is due to lack of awareness among scientists in using microforms.

The book entitled *Hevea: Thirty years of research in the Far East* by M.J.Dijkman is the most favourite book among rubber scientists.

6.14 Adequacy of Collection

6.25% scientists never felt the need for getting materials from libraries other than Institute's Library. 84.37% felt the need occasionally and 9.38% very frequently.

Inadequacy of the collection has been clearly expressed by users in the field of dissertations/theses. Current periodicals are more adequate than the other types of documents.

42.19% scientists have the opinion that the collection in the RRII Library is not a balanced one. The users expressed that the collection in the RRII Library is to be improved so as to meet their increased needs.

6.15 Use Pattern of Current Information

The scientists explore almost all types of information sources especially current periodicals, indexing/abstracting periodicals,

etc. for getting current information. The majority (76.56%) of users consult primary periodicals so as to abreast with current developments in their fields. Their second preference (14.06%) is indexing/abstracting periodicals. Institute's current awareness service constitute the third preference.

Irrespective of the category of users, for getting information/documents pertaining to a specific topic, the majority (43.75%) get information by searching on shelves, 25% each by asking librarian and consulting the catalogue and 6.25% by discussion with colleagues. Lack of proper catalogue prompt the users to search the documents on shelves.

For obtaining references of periodicals the majority (72.13%) of users expressed that they scan through the issues of periodicals. But 16.39% users give preference to the indexing and abstracting periodicals and 11.48% prefer to use local documentation lists for getting references of periodicals.

For a comprehensive literature search on a specific research topic, 55% scientists do not find any difficulty whereas 45% scientists experience difficulty due to the inadequacy of the collection of books, periodicals, theses and lack of catalogue.

6.16 Use habit of library services

The services provided in the RRII Library are inadequate. A majority of the users are unaware of the existing services provided

internally and services provided externally by agencies like INSDOC, IARI, etc. 30.06% scientists utilize reprography service. 9.2% are making use of translation service and SDI service. These two services are the least familiar among scientists. The majority of scientists may not be aware of translation services provided by the library and so they hesitate to use foreign periodicals.

6.17 Frequency of visit to the library and use habits.

Majority of scientists (42.19%) visit the library at least once a day and a negligible percentage (3.13%) of scientists several times a day. The majority (58%) of scientists spent about 2 hours during each visit to the library.

Scientists spent 33% of the total time spent in the library for reading articles in subject periodicals and 23% of the time for reading subject books and notestaking.

6.2 Suggestions

The above findings have wide implications to the improvement of library organization and services. It is assumed that if one understands user needs, use pattern and use behaviour, it is easy to modify an information system quite condusive to the environment. Although the study is confined to the scientists in the Rubber Research Institute of India, the result can be assumed to be a well representative of the user needs and use pattern of rubber scientists. Based

on this generalization a few suggestions have been put forward to improve the present situation.

i) Since the maximum number of researchers are interested in Rubber Chemistry and Technology and Plant Pathology, the bibligraphical control of documents in these subjects should be strengthened.

ii) High priority assigned to periodicals is justified by the findings and it must be continued. As periodical literature deserves greater importance, existing gaps in certain titles are to be filled up.

iii) Secondary periodicals are tools for leading the specialists to the vast current literature in their field. Citation analysis cannot give any indication as to the use of secondary periodicals. From the questionnaire, it is found that these sources are under utilized. It is to be enlisted as part of documentation activity. These secondary sources and the importance of documentation lists should be brought into the attention of the scientists and the use of these should be promoted as these are time saving tools. For the effective utilization of these sources, user education programmes to scientists may be attempted.

iv) The use of microforms by scientists is very less. There are signs that the printed world is gradually changing into 'paperless age' and 'paperless society' and so the use of microforms such as microfiche, microfilm etc. should be encounraged. For this, identification, location and acquisition of these materials in the various subject fields of rubber should be attempted. Moreover, for the use of equipments like microfilm reader, proper orientation to the rubber scientists may be imparted.

v) Inadequacy of documents are felt in the area of dissertations/theses. So the acquisition of these types of materials to be improved to satisfy the needs of the scientists.

vi) The materials like standards and patents that are very useful to the researchers are underused. In order to acclerate the use of patents and standards, it should be properly organized and latest ones should be brought to the notice of the users.

vii) The use of foreign language journal is comparatively less. For this, local translation services can be attempted. This will encourage the scientists to refer more journals published in foreign languages other than English.

viii) Attending seminars and conferences are the means to equip latest information in a subject especially in science and

technology. But interest in attending the same is less in Rubber Scientists. So they will be motivated to attend more conferences in the field to abreast with the current developments in the subject.

ix) It is found that the present system of services provided to the rubber scientists by the RRII Library is inadequate. So introduction of sophisticated services by using modern gadgets like computers is a timely demand so as to have a maximum exploitation of the resources on rubber for the scientific and technological advancement in the field.

x) The frequency of visit by users in the library is not so appreciable. By improving the facilities in the library and rendering effecient services, the frequency of visits to library by the scientists can be increased.

xi) The median age of citation in rubber literature is 9 years. By taking 9 years as the cut off point, weeding or compact storage of materials can be explored.

xii) It is noted that out of the 550 journals being subscribed to the RRII library, there are 107 journals in which atleast one scientist is interested. Considering the escalating cost of journals, elimination of some of them can be undertaken.

The library services should not be confined to traditional library activities, but should be widened to include essential documentation services so as to channelise useful information to the target users. The institute has also a leading role to play in improving the bibliographical organization of literature relevant to the scientists. The prospective librarians have to act as filters between recorded knowledge and the users in an effort to provide improved quality of services to the clientele. The study carry wider implications to the overall design and improvement of library services.

APPENDIX - I

Q U E S T I O N N A I R E

Note: Please indicate your answer with tick mark(s) in the concerned bracket(s) unless asked to do otherwise.

0   **Personal Data**

0.1 Name

0.2 Qualifications

0.3 Designation

0.4 Official Address

0.5 Foreign languages known
     other than English

0.6 Area of specialisation

0.7 If you are a research
     scholar, state the title
     of your research/project
     topic (Please indicate
     Ph.D., Post doctoral or
     Project topic)

1.   **User Needs**

1.   1.1 What are the different types of information
         sources required, to meet your research needs?

         (Please indicate your preference by numbers
         1,2,3 etc.)

         a) Books (text books and other
             monographs)   (   )

         b) Reference books (encyclopedias
             dictionaries, handbooks etc)   (   )

         c) Current Periodicals   (   )

         d) Backvolumes of Periodicals   (   )

         e) Indexing/abstracting   and
             reviewing periodicals   (   )

         f) Technical Reports   (   )

         g) Conference/Seminar proceedings   (   )

h) Patents and standards ( )

i) Dissertations/theses ( )

j) Reprints and Photocopies ( )

k) Bibliographies ( )

l) Informal sources(Discussions with
   colleagues, internal seminars etc) ( )

m) Formal sources (Attending seminars
   Conferences, workshops etc) ( )

n) Other sources, Please specify

1.2 Are you a regular user of journal?

Yes ( ) No ( )

If 'Yes' list the most essential titles in your subject in the
order of your preferences.

1.3 Are you a user of indexing and abstracting periodicals?

Yes ( ) No ( )

If 'Yes' please list a few essential titles of your interest
in the order of your preference

1.4 Do you make use of foreign periodicals in the languages other than
English?

Yes ( ) No ( )

If 'Yes' please list such periodicals in the order of your
preference.

Name of Periodicals   Languages

1.5 Do you use Microfiche/Microfilms?

              Yes ( )   No ( )

1.6 How often have you felt the need for materials not available in your library?

  1. Very frequently   ( )

  2. Occasionally   ( )

  3. Hardly ever .   ( )

1.7 Please indicate areas and extent of adequacy felt in respect of the following category of documents.

	Adequate	Partially adequate	Inadequate
a) Books	( )	( )	( )
b) Reference Books	( )	( )	( )
c) Current Periodicals	( )	( )	( )
d) Backvolumes of Periodicals	( )	( )	( )
e) Indexing/abstracting and reviewing periodicals	( )	(.)	( )
f) Technical reports	( )	( )	( )
g) Conference/Seminar Proceedings	( )	( )	( )
h) Patents and Standards	( )	( )	( )
i) Dissertations/theses	( )	( )	( )
j) Reprints and Photocopies	( )	( )	( )
k) Bibliographies	( )	( )	( )
l) Other items, please specify			

1.8 Do you think that there is a balanced collection in the library in the area(s) of your research?

<div align="center">Yes ( ) No ( ) ◦ ⸱⸱</div>

2. Use Pattern

2.1 How do you know about the current developments in the field of your subject?
(Please indicate your preferences by 1,2,3 etc)

a) Institute's Current Awareness Service ( )

b) Current Periodicals ( )

c) Indexing and abstracting periodicals ( )

d) Discussions ( )

e) Conferences ( )

f) Seminars ( )

g) Correspondence ( )

h) Book trade catalogues and announce-
ment bulletins ( )

i) Any other, please specify

2.2 How do you find out what are the information sources the library has on a specific topic of interest to you?
(Give numbers 1,2,3 etc according to your preference)

a) Asking the librarian ( )

b) Searching the shelves ( )

c) Consulting the catalogue ( )

d) Discussion with colleague ( )

e) Any other method, please specify

2.3 How do you come across information regarding articles or papers in recent issues of periodicals that are received in the library?

a) By scanning through the issues in the library ( )

b) Through indexing, abstracting or
reviewing periodicals ( )

c) Through local documentation list
prepared and circulated by the library ( )

d) By any other means (Please specify)

2.4 Have you felt any difficulty in conducting a comprehensive literature search in connection with your research work?

Yes ( ) No ( )

If 'Yes' please give the problems.

2.5 The following are some of the services usually provided to the users in a library. Have you utilized any of the services?

Yes ( ) No ( )

If 'Yes' what are the following services?

a) Fact finding service ( )

b) Referral service (Directional service) ( )

c) Latest addition list of books ( )

d) Reprography services (xerox copy etc) ( )

e) Interlibrary lending service ( )

f) Newspaper clipping service ( )

g) Current content service ( )

h) SDI Service (Intensified personalised
service) ( )

i) Translation Service ( )

2.6 Do you utilise any services from the following centres?

	Yes	No	Services
a) INSDOC, New Delhi	( )	( )	( )
b) IARI, new Delhi	( )	( )	( )
c) Informatics, Bangalore	( )	( )	( )
d) National Centre for scientific Infor- ation, Bangalore	( )	( )	( )

e) other, please specify

2.7 State your opinion with regard to the library services generated from your library for your research work?

Adequate   (   )

Partially adequate   (   )

Inadequate   (   )

If your opinion is inadequate/partially adequate please state what are the types of services that you are expected from your library.

3. <u>User Behaviour</u>

3.1 How often do you visit the library?

1. Several times a day   (   )
2. At least once a day   (   )
3. At least once a week   (   )
4. Occasionally   (   )

3.2 Average time spent in the library during each of your visits.

...... Hours ......Minutes

3.3 State what proportion of the total time spent in the library is use for the following purposes

a) Searching for documents   .....%

b) Searching for specific information   ....%

c) For reading subject books and notes taking   ....%

d) For reading articles in subject periodicals   ....%

e) For reading recreation materials like novels   ....%

f) For reading newspapers and popular journals   ....%

3.4 Please give your suggestions if any regarding the collection, technical organisation of collection and services for the overall development of the library.

Place:

Date :

APPENDIX - II

LIST OF JOURNALS OF RUBBER

1. Abstracts on tropical agriculture
2. Agrindex
3. Annual Reports of RRIM`
4. Annual Review of RRISL
5. British Plastics and rubber
6. Bulletin Perkareta
7. Business Information Bureau: Parliamentary digest on rubber industry
8. Chinese Journal of tropical crops
9. Current Contents: Agricultural biology and environmental sciences
10. Elastomerics
11. European Rubber Journal
12. Fitopatologia Brasileira
13. Horticultural abstracts
14. Indian Journal of natural Rubber Research
15. IPS News bulletin on rubber industry
16. Journal of Elastomers and Plastics
17. Journal of Natural rubber research
18. Journal of the Rubber Research Institute of Sri Lanka
19. Menara perkebunan
20. Modern Tire Dealer
21. Pesquisa Agropecuaria Brasieliera
22. Planter
23. Planters Bulletin
24. Planters Chronicle
25. Plastics and rubber processing and applications

26. Plastics and rubber international
27. Plastics and rubber weekly
28. Progress in rubber and plastics technology
29. Progress of rubber technology
30. Rapra abstracts
31. Retreaders journal
32. Revista Theobroma
33. RRISL Bulletin
34. Rubber and Plastics digest
35. Rubber and Plastics news
36. Rubber and Plastics News II
37. Rubber Asia
38. Rubber Chemistry and Technology
39. Rubber Reporter
40. Rubber Southern Africa
41. Rubber Trends
42. Rubber Chem Review
43. Rubber World
44. Tire Repair Journal
45. Tire Review
46. Tire Science and Technology

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