

CHAPTER- 4

INFORMATION NEEDS AND INFORMATION USE PATTERN BY SCIENTISTS: A CONCEPTUAL FRAMEWORK

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INFORMATION NEEDS AND INFORMATION USE PATTERN BY SCIENTISTS: A CONCEPTUAL FRAMEWORK

4.0 INTRODUCTION

Information has become a multidimensional necessary component for all human endeavors in the present day society which not only improves the quality of man, but also helps in improvement of our social economic, intellect, cultural, scientific and technological as well as national developments. It is crucial in the present day society to provide the right information to the right user at the right time in the right form. User is supreme in any library and information system. All the luxuries of information revolution and problems of information explosion are centered on the user and his convenience. The users are varied in nature types which depend upon the place, age, type of library etc. The Varied needs of the users can be fulfilled through different communication channels. In any communication channel, a user is the last recipient of information centers in various ways and means. The communication process of the libraries and information centers is supposed to act as effective agency for the timely communication to the users with relevant and comprehensive information. For this, the library and information centers required to be equipped with sufficient varied collections irrespective of the areas. It further needs to be arranged properly and develop competency for right collection of documentary, non-documentary and electronic resources so as to retrieve the documents, information timely, instantly and can be properly disseminated. The users of information agencies are also interested and trained in gathering information, so that they can utilize the information very effectively and efficiently. The education and training of users is an important factor in the effective use of available information. In the changing dimensions of information handling process, every aspects of information agency not only calls for automated service but also

change their traditional role of being storehouse of books into effective service of information agencies.

Information is a basic component for Research and Development work. Proper and adequate information is essential for scientific and economic progress of a nation. Scientist needs information for satisfying their desires for which they have to seek information. A scientist in the broadest sense refers to any person who is engaged in a systematic activity to acquire knowledge or an individual that is engaged in such practices and tradition that are linked the schools of thoughts or philosophy. In a more restricted sense, scientists refer to the individuals who use the scientific method in acquiring information and organize, analyze and implement the same in the area of his research or subject. Communication starts with bench level worker within the laboratory. Later, the developed hypotheses were communicated to a larger circle in seminar/conferences. Scientists improve their idea and after some time they attain some degree of perfectness and then communicated through Journals to a wider circle. In this process the invisible college makes his idea more perfect by means of both positive and negative criticism. A perfect idea is called a theory and then it appears in books. Secondary/Primary sources helps in propagations of idea globally.

Scientists significantly depend on communication with fellow scientists/specialists so as to keep abreast with current development in the subject/research. Research workers almost always rely on the work of other scientists working in the same field. Further, scientists are not actively involved in research but also frequently search for information pertaining the latest trends and developments in the subject including the area of research which facilitate with to up-date professional information. They also acquaint themselves with new innovations in their field. Thus information helps the scientists to get well informed with current developments in their subject.

4.1 INFORMATION: MEANING

Information` is power which is more complex a term but easy to comprehend. The term 'Information, therefore, denotes various meanings, as there are definers. The Oxford English Dictionary defines "Information" as the action of information; formation or

component of the mind or character, training, instruction, teaching; communication of editing knowledge. Information, according to Random House Dictionary for the English language means knowledge communicated or received concerning a particular fact or circumstances. By information, Webster's Third New International Dictionary for the English Language means that it is a knowledge communication or reception of knowledge or intelligence. It is a knowledge communicated by others or obtained through investigation, study or instruction, study or instruction. Information thus can be defined as a concept, statement and idea or an association of concepts, statements and idea. Further, it is also can be well defined as a message conveyed or intended to be conveyed by a systematized body of ideas, or it is accepted or acceptable substitutes.

According Shannon and Weaver (Sharma; 2007; pp 341-360), "Information is any stimulus that reduces uncertainty."

According to Norman (1986) "Information in one form or another, has constantly been of significant element in the development of human society and it has shaped over a long period of time, the way in which we think and act".

Bateson (1972) who had been in the process of finding a mathematical definition for information for two decades defined it as "any difference that makes a difference to a conscious human mind".

Miller (1968) defines information as "any stimuli we recognize in our environment".

Since 1950's information relates to the concepts like knowledge, a fact, data, message, signal and a stimulus. Hence, information can know as the structures of any text, which is capable of changing the image structure of recipient. Knowledge communicated by others or obtained by personnel study and investigation or alternatively as knowledge of a special event, situation or the like.

4.2 INFORMATION NEEDS

The need for information is a factual situation in which, there exists an inseparable interconnection with 'information' and 'need'. Information originates and is generated because their existence of a need or an interest. The need for information with specific

content is an objective demand of the user. If an individual is in need of specific information for realizing specific tasks, then the need for information is an objective information need, that is, qualitatively, and quantitatively determined information needed by an individual for solving an objectively assigned task. The field of information needs and uses in library and Information and Sciences (LIS) is broadly defined as that which is concerned with information seeking, determining users needs for information, and information use.

4.2.1 Information Need: Definition

Defining the 'information need' requires a definition of the term 'need'. Dictionary meaning of the various related terms are as follows:

Need: Want of something, which one cannot well do without. Need for information or entity as perceived by others ('objective' assessment based on problem analysis, commonly referred to as need).

Want: A state or fact of being without or having an insufficient quantity, absence or deficiency of necessities.

Requirement: It is a need, a thing needed; a necessary condition.

Demand: Demand is a need as articulated by the potential user or by information system (recognized need).

Use: A use may be a satisfied demand, or it may be the result of browsing or accident. A use usually represents a need of some kind. Use can be partial indicators of demand, demand of wants and want of needs.

The Information need has been defined variously by different peoples. Some of the definitions are given below:

Taylor (1968) introduced the concept of information need as a Personal, Psychological, sometimes in expressible, Vague and Unconscious conditions.

Wilson (1981) stated the view that information need motivates. Information behaviour is an embedded assumption of the user oriented paradigm which focuses upon what people think, do and feel when they seek and use information.

According to Belkin (1982) “Information need is described as an anomalous state of knowledge”.

From the above definitions it has been found that Information needs is a composite concept of different types of requirements and approaches and approaches to information. An information need is a condition in which certain information contributes to the achievement of a genuine or legitimate information purpose. It is a relation, which obtains between information and information purpose.

4.2.2 Identification of Information Need

Identification of Information Need is very essential in a research process in order to satisfy the information need. Even after the identification of Information Needs it is difficult to satisfy the information need of users. Girija Kumar (1980) in his study rightly mentions that the information needs are expressing as input- process- output models and it can be represented by figure-4.1 designed below:

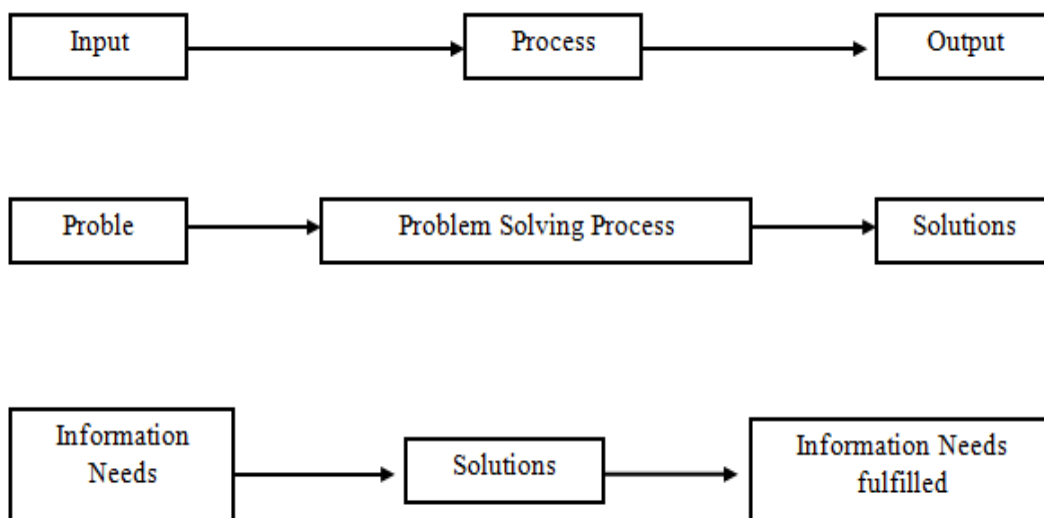


Figure- 4.1: Models of Identification of Information Need

4.2.3 Information Needs of Scientists (R & D)

Science is the branch of knowledge that requires systematic study and knowledge of the natural or physical phenomenon. In the field of science, the major activity is experimentation. Experiments are carried out on substances, on life and on natural laws.

On the basis of these experimentation scientists come up with certain principles or rules. Science is one big body of knowledge, which is broken up into smaller division:

- **Natural Sciences:** It is deal with natural surroundings. Subjects like Biology, Botany, Physics, and Chemistry etc. are included under this category.
- **Applied Science:** In applied sciences, the principles are used for doing and making things. The subject include here are computer science, artificial intelligence, electronics, etc.
- **Social Sciences:** It deals with human beings, their actions, relationship problems etc. the social science are usually studies separately.

The scientist is an expert in science and contributes a lot to the society. Most of their discoveries and inventions have gone a long way towards making life easier for mankind. Thus it goes without saying that the scientist needs information in a major way. Because science is ever growing, the need for information by the scientists is also ever growing. In fact it has been said that, “A working scientist spends up to one third of his time searching for information and the cost of this search represents one fifth of all the money allocated to science” (Laloo, B.T., 2002; pp.32).

Since scientists are involved in research and development, their information needs also revolve around these activities. Scientist needs information at every step of his research work, from the time that the germ of an idea sprouts in his mind to the time of its taking shape.

4.2.4 Scientists Approach to Information

Scientists need different types of current information, at different stages of their research work. They have the following approaches to information.

➤ Current Approach

According to this approach, scientists need information on what is going on currently (a) in their field of work and (b) in fields similar to there or in a broader field. To fulfill this type of information need, the scientist has to interact with the information need; the scientist has to interact with the information system constantly.

➤ **Every Day Approach**

In the course of their daily work, scientist need specific pieces of information (an equation, a formula, etc.) for such type of information, the scientist requires specific and quick answers.

➤ **Exhaustive Approach**

This involves a thorough examination of all the relevant information on a particular subject, i.e. its current position problem, etc. Such information is required at the beginning of a new research project or when the scientist has come to the stage of reporting the results of an investigation. Apart from the above the ‘catching up’ approach may also be mentioned. Here, there is a need for information on a field in which the scientist is not much expert. This can be a field which is not his main interest or which may not be related to his own field. He is not quite current in this field as a result of which the catching up approach arises. With the rise of ‘interdisciplinary’ today, such an approach is relevant.

4.2.5 Factors Affecting the Information Needs of Scientists

There are different systems that affect the information needs of scientists. These include the following:

➤ ***The Scientist within His own head***

This is the system of motivation of intelligence and creativity, of cognitive structure of perceived relevance of information inputs and uses of information outputs. Ultimately all other systems support this system.

➤ ***The Scientist with His work team***

Teamwork is the phenomenon of the day. Single author articles / books are now rare in the field of science. The scientists need for information depends on his position in and his interaction with the team. The work team is the most significant information source for the technologist as very nearly as important to the scientist as well. It contributes to the production of high quality R&D projects. The higher the level of communication a scientist has with colleagues, the better his performance. The role of the chief, i.e. ‘Technological Gatekeeper’ of the team is very important. He allows the effective entry of information into the organization and also abets its dissemination within the organization.

➤ ***The Scientist within formal organization***

The scientist is a part of a research and development organization. The formal organization reaches into the scientist's daily routine, affecting his use of information with policies, governing funds, freedom etc. The formal organization can either open or block channels of information to the scientists.

➤ ***The scientist within an "Invisible College"***

The "Invisible College" is an informal group of scientist with no name or headquarter and a few members, sharing their resources and doing cross citation. It is a type status group and the members given priority to their group in all aspects. The invisible college selects its own society and shuts the doors. A scientist's information need is depend on whether or not he belongs to an invisible college.

➤ ***The scientist within a Political system***

A political system plays important role in the flow of information. When the political system believes in sciences, funds will flow readily. Access to governmental information is still limited. Science can easily grow in a democratic society.

➤ ***The scientist within his own culture***

A scientist is part of scientific culture. Every culture has values of conduct. The scientific culture best suited for the flow of information is one where there is freedom of expression, respect and rewards.

➤ ***The scientist within a reference group***

This is an informal group with no formal information system. It includes other scientist with similar specialization, similar training, excellence of work or other characteristics. It is considered to be higher than invisible college.

➤ ***The scientist within a membership group***

Professionals are members of one or the other group (associations, organizations etc.). For scientists especially, it is important to be a member of such groups. The scientist's information need depend on whether or not he has belongs to any association /organization. The membership system may govern the scientist's appearance on its

convention programmes may appoint him to the editorial board of its journals etc. There are three ways by which an association can provide information to its members, through Newsletters, periodicals and conferences.

4.3 THE USERS

Users are the important factor without which an information system loses and gain its whole purpose. In the library setup, it is extremely important to understand who are the users, their information needs and the way by which their needs can be satisfied by the library. User is the term that is generally employed refers to clients of information services and libraries and to participants or respondents in research studies. User can be categorized according to the type of work that they are involved in:

- ❖ **Individuals:** Housewives, farmers, social workers, ex-servicemen, labourers and students etc., are comes under this category.
- ❖ **Government Agencies and Departments:** It includes administrators, policy makers etc.
- ❖ **Industrial Enterprises:** Entrepreneurs, managers etc are individual users.
- ❖ **Research Institutions or Scientific Organizations:** It consists of Research scholars, scientists in the basic and applied sciences etc.
- ❖ **Cultural Organizations:** keepers of culture, i.e. musicians, dancers, Traditional chiefs etc.
- ❖ **Religion Organizations:** Pastors, Priests, Nuns etc. are the examples of uses belonging to religious organizations.

To create information awareness and to promote the use of information, it is necessary to know the needs of the users. Extensive study of the population is required to be conducted for the compilation of user groups. The user's individuals, government agencies and departments, industrial enterprises, research institutions, scientific and cultural organizations are to be grouped into a homogenous group with similar characteristics. Within the homogenous user group of similar subject areas, information requirement of different category of users, i.e. practitioners, research workers, students, teachers, policy makers, administrators, entrepreneurs, etc be identified. Users can be grouped up by subject/discipline or by the type of activity. There are differing user needs for various categories of users. If information is a process and a commodity, and human

are involved in both then the service that supports these functions should in fact have the capability of aligning both towards the achievement of maximum user satisfaction. It has been realized that the 'user' although being the most important component in any information system has been given inadequate consideration from almost any point of view in most information supply systems existing today. In great majority of cases, the user is neither understood, nor in some cases, even identified until after the system is in a complete operational state. An information system defined as an organized flow of information from source to users. Users are the important parameter of any information and the nature of user, his problems, and his needs are identified by conducting user study after the system has been designed.

4.3.1 User's Study: The Concept

User studies, use studies, information use studies, information-need studies, user research, etc are the similar words which are closely related and often not precisely differentiated. All these studies come under the umbrella of 'user study'. User study is the means for systematic examination of the characteristics and behaviour of the users of the systems and services. The user study is directly linked with the effectiveness (performance) of library and information services as they aim at satisfaction of user needs. User studies imply a willingness to relate product or system design to perceived needs of those for whom the product or system design is intended. The term user study is mainly concerned with studying information processing activities of users.

User study is analogous to the efforts of manufacturer who surveys his market for the product that he proposes to produce. In the context of a library and information system, it is extremely important that in depth studies are conducted to acquire the actual and potential needs of users. In the library, the collection building, processing and organization and services will depend naturally on the needs of users, if the library has to justify itself for its existence. User studies therefore have assumed great importance and considered functional component of any well organized information system.

In the simplest term 'user study' means a study of the user of information. The kind of information required by the user the ways and means used for searching the required information, the use of the information obtained, the satisfaction/dissatisfaction arising from the use of the information obtained, the flow of information and the relationship of the user with the system, all come under the preview of user studies. It is

the means for systematic examination of the characteristics and behaviour of the user of the systems and services (Laloo; 2002; p.105).

Hence, user study is very essential to know the requirement of user community to find out the basic need of information and to supply the same in an organized form from the vast array of information which will activate the area of research.

4.3.2 Growth and Development of User Studies

The origin of user studies is in the platform of Royal Society's Conference on Scientific Information in 1948 in London and the Washington Conference of 1958. A study entitled 'Pilot Study' of the use of scientific literature by Scientist conducted by Ralph R. Shaw is considered another pioneer study in this direction. An Attempt to understand the scientific communication system, its function and channels, a study was carried out by Glock, Menzel, Glessner and Sower, in which 77 scientists were interviewed in order to define problems; categories to: (i) Discover types of information needs, (ii) The means and occasion of scientific information exchange; and (iii) Characteristics of the scientists specially, institution and personal outlook as they influence his information gathering habits and felt satisfaction.

In 1959-60, Voigt did a study to scientist approach to information and to relate these approaches to the purpose for which information was sought (Prasad; 1992; p.77-79). User study is an old idea getting new dimensions in current era. Praised as well as criticized for its objectively and lack of theoretical foundation, respectively. According to Herron first systematized study was made on academic environs and its users in 1920. One of the important landmarks in the history of user studies was the establishment of the center for research on user studies in 1975 at the University of Sheffield. The center became fully operational on 1st January 1976. Several individuals and organizations have been actively engaged in conducting user studies to bring suitable reform in the system.

4.3.3 User's Approach to Information

Characteristically managerial scientists are pre occupied more with managerial functions than with research functions. Most part of their time is consumed in activities categorized as politics, planning, and co-ordination of research programme between various scientific departments. They are generally hard pressed with time, but to keep up the research functions they do depend upon their subordinates for information Researchers are more

willing to delegate retrospective searching than current searching. The feedback from them is generally in the form of oral information, written information etc. The project leader also delegate literature search functions to their working scientist, not because of their pre-occupations in managerial function, but essentially to those labour and to keep up with their time schedule.

Accordingly Wershing and Nereling had landed following six basic approaches to information (Prasher, 2003, pp.97).

- **Structural Approach:** In this approach information is viewer as structures of the world or static relations between physical objects which may be perceived or not.
- **Knowledge Approach:** This approach records knowledge that is built on the basis of perception of the structure of the world. But the problem with this approach is that the term ‘information may erroneously be used for term ‘knowledge’.
- **Message Approach:** The mathematical theory of communication uses this approach. It is concerned with the transmission of symbols representing a message.
- **Meaning Approach:** In this approach, the semantic content of a message is accepted as information.
- **Effect Approach:** This approach says that information occurs only as a specific effect of a process; and
- **Process Approach:** According to this approach information occurs in the human mind when a problem and useful data are brought together.

Thus, it is clear from the above discussions that there is no unanimity of opinion relating to the approach of the users. Each approach varies from other approach accordingly to the type structure, degree of knowledge associated problems, purpose and nature of each user’s information requirement however, the library being a service institution as the moral responsibility to examine and understand these approaches carefully, in order to meet the information requirement of all these approaches.

4.3.4 Steps for User Study

User studies are basically concerned with people, their attitude, priorities, preferences and behaviour. Hence the step used by the researchers particularly, scientists are quite relevant for user studies. In other words research is a way to systematically solve the research problem by logically adopting various steps following are some of the main steps for conducting a user study:

- Selection and formulation of research problem and working hypothesis;
- Literature survey;
- Overall design or planning the strategy of the study;
- Sampling and sampling strategy of plan;
- Data collection;
- Pilot study;
- Processing and analysis of data;
- Testing of hypothesis;
- Interpretation, generalization and realizing of objectives.
- Preparation, writing, presenting and dissemination of research results.

If the scholar conducting user studies fails to follow these basic steps, he is bound to being results redundant to the study besides consuming more times and making the study unsystematic and far from reliability.

4.3.5 Significance of User's Study on Library Development

User is the key purpose and user is key and one of the most dynamic components of library and information system. As such user and user Studies including non-use and non-user studies are required to be carried out as long as library and information system require its existence.

The efficient and effective operation of a given library and information system, therefore depends on the extent to which the system characteristics corresponds with the users and how much the potential users are willing to accept the system also have to properly consider the role of human factors and their effect on acceptance and utilization of information. The system or product / service must address to the perceived

needs of these for whom it is intended as well as to guide the operation of the system. A systematic user study can also reveal some unanticipated data about the dynamic component of the user. Further as no system has sufficient resources and funds, user studies are required to check whether intended goals are served by the system, it not to alter the priorities and programmes so as to ensure judicious allocation of limited resources to make the existing system more purposive and user friendly. User studies are also required not only to determined and confirm the general patterns of use of libraries, but also to identify departures from the prescribed norms, even if it is only in a small area. User studies help to improve public relation of a library with its users and explain what librarians have found out by more indirect means.

4.3.6 Use of formal and Informal channels

Like other professionals, scientists to resort to both formal and informal channel when seeking information. Formal channels are newspapers, microforms, films, research reports, patents, etc. Informal channel are conferences, seminars, interaction with colleagues etc.

As regards their use of, and interaction with the library, studies have focused that scientists depend less on libraries and librarians because they have a low image of these and also because if their earlier bad experiences in relation to libraries:

- ✓ They also find the libraries catalogue time taking and ineffective.
- ✓ Journals are usually the first priority for scientist whose needs for ‘current’ and information cannot be overemphasized.
- ✓ For maintaining awareness cannot be over emphasis.
- ✓ Where purchases of books for personal collections is concerned, it is found to be quite an impossible task for scientist as books are expensive if they come in volumes.

4.4 INFORMATION SEEKING BEHAVIOUR

When a need is felt for anything, more often than not, people take action in order to satisfy that need. Different strategies or modes action are resorted to. The same applies for the satisfaction of information needs. An individual realizes that he needs information, he knows that in all probability the information will not come to him on its own, therefore he has go to about seeking it.

Information seeking is a process in which humans engage to purposefully change their state of knowledge. The process is inherently interactive as information seekers direct attention, accept and adapt to stimuli, reflect on progress, and evaluate the efficacy of continuing. Information seeking is thus a cybernetic process, in which knowledge state is changed through inputs, purposive outputs, and feedback. Information seeking is, however, a strictly human process that requires adaptive and reflective control over the afferent and efferent actions of the information seeker.

The phrase 'Information seeking Behaviour' has been defined by different authors. The following definitions of will make the concept more clear.

Ching-Chih Chen has defined information seeking as follows, "Information seeking patterns are the paths pursued by the individual in the attempt to resolve a need." (Chen, Ching-Chih; 1982; pp.5).

A very practical and broad definition of Information seeking behaviour is given by Auster (1982, pp. 178) as "the field composed of studies that are concerned with who needs what kind of information and for what reason; how information is found, evaluated and used; and how these needs can be identified and satisfied."

According to Girija Kumar, "Information seeking behaviours is mainly concerned with who needs what kind of information for what reasons; how information is found, evaluated and used." (Kumar, Girija, 1990: pp. 257).

Wilson (1999; pp. 249) defines what he calls 'Information Behaviour' as, "those activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information."

Thus, it stems from the above definitions that the act of searching or finding information can be ascribed to information seeking. Such an activity begins when the user perceives that the existing knowledge is less than the needed to deal with some problems.

4.4.1 Models of Information Seeking Behaviour

Some structure or framework is needed to research information users and their information seeking behaviour. Models are such structures or frameworks which represents and to have clear understanding on specific problems which lead to the development of formal theories. Models are presented through illustrations like diagram, chart, map, table, and graph, etc.

Wilson (1999) describes information behaviour models as frameworks for thinking about a problem that may evolve into a statement of the relationship among theoretical propositions. Models are therefore providing frameworks for information user behaviour and research and also give a clear understanding of user's information behaviour.

There are many models for Information Seeking Behaviour. Some of them are describe below:

4.4.1.1 Wilson's Model of Information Behaviour

T. D. Wilson defines who he calls "Information behaviour" as, " those activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring that information." (Wilson; 1999; pp. 249 - 270). According to him a model may be described as a framework for thinking about a problem and may evolve into a statement of the relationship among theoretical propositions. A model of information is a variation of Wilson's model of 1981. The aim of this model was to outline the various areas. This model suggests that information seeking behaviour arises as a consequence of a need perceived by an information user and in order to satisfy that need makes demand upon formal or informal information sources which results in success or failure to find relevant information. The following figure- 4.2 is the Wilson's model for information behaviour.

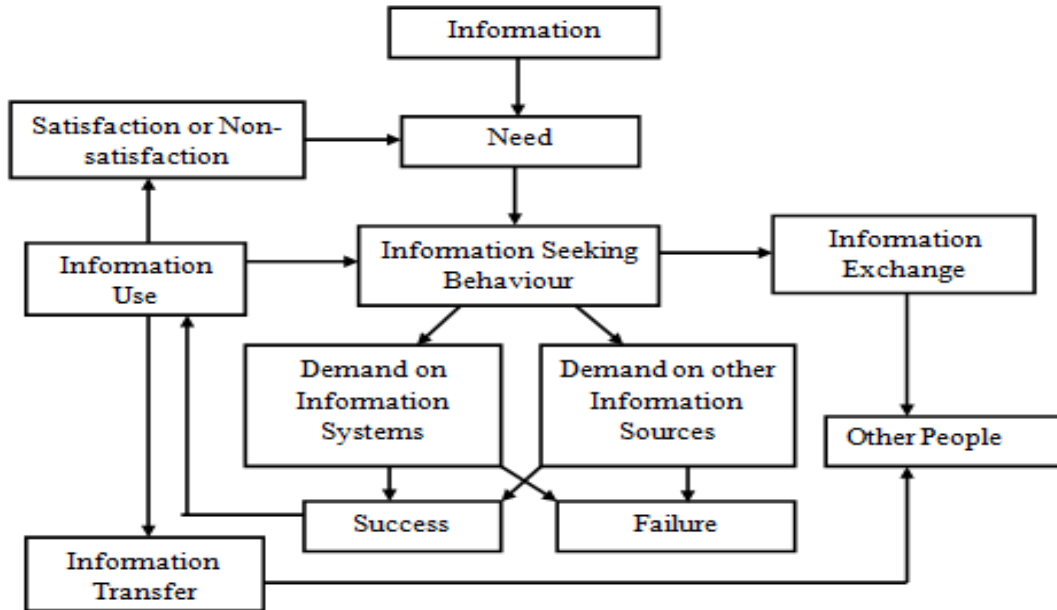


Figure- 4.2: Wilson's Model of Information Behaviour

(Wilson; 1999; pp. 249-270)

4.4.1.2 Wilson's Model of Information- seeking Behaviour (1981)

This model suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who in order to satisfy that need, makes demands upon formal or informal information sources or services, which results in success or failure to find relevant information. If successful, the individual then makes use of the information found any may either fully or partially satisfies the perceived need- if he fails to satisfy the need, he will have to start searching again. The model also shows that part of the information-seeking behaviour may involve other people through information exchange and the information perceived as useful may be passed to other people as well as being used by the person himself or herself. The figure- 4.3 is the Wilson's model of information seeking behaviour designed in 1981.

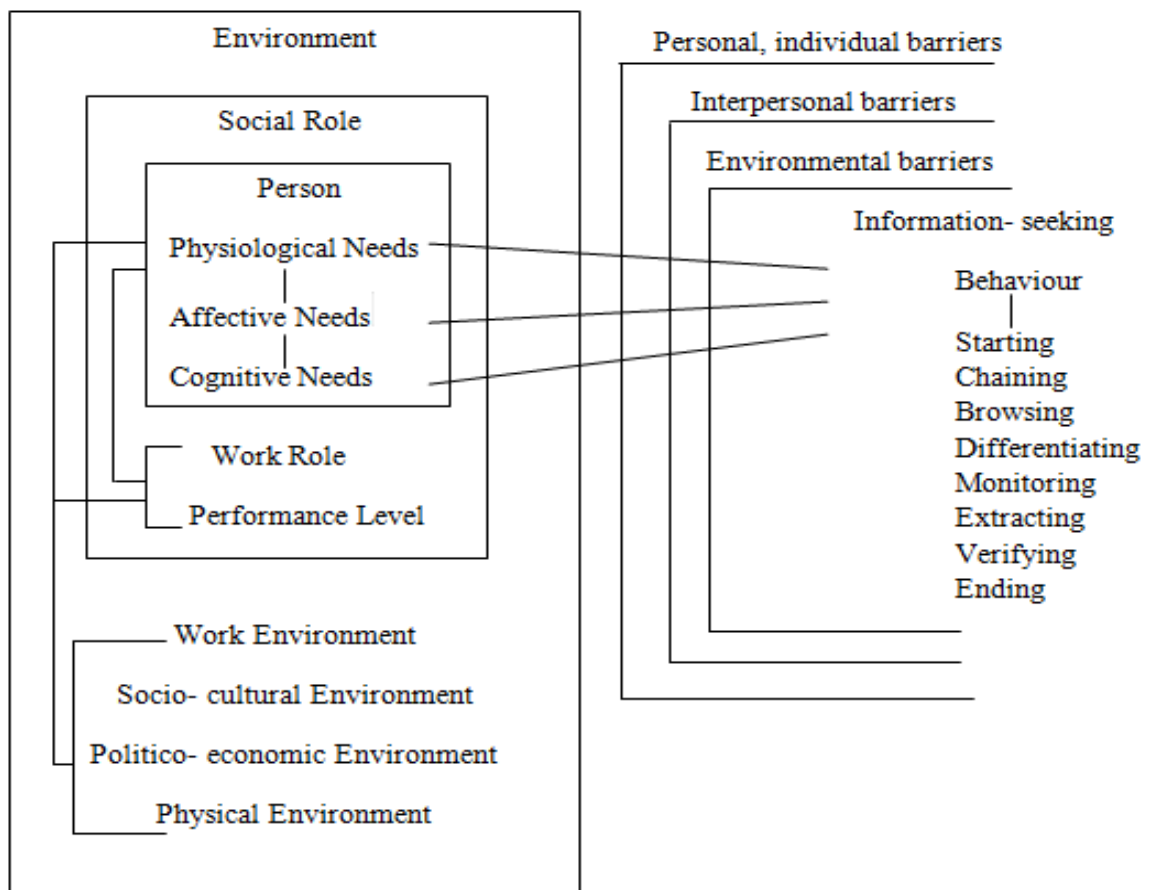


Figure- 4.3: Wilson's Models for Information Seeking Behaviour (1981)

(Wilson; 1999; pp. 249-270)

4.4.1.3 Wilson Model (1996)

In 1996, Wilson revised his earlier model after drawing upon research from a variety of fields other than information science, including decision making, psychology, innovation, health communication and consumer research. While the basic framework of the 1981 model remains, the revised model had a few additions as designed in the Figure- 4.4 Wilson's Model of Information Behavior (1996).

The features of the model are affected by six types of variables namely psychological aspects, demographic background, role related or interpersonal, environmental variable and source characteristics. This model also recognizes information search behaviours like Passive attention, Passive search, Active search and ongoing search. The term 'information processing and use' means the information is evaluated to know its effectiveness on satisfying the need.

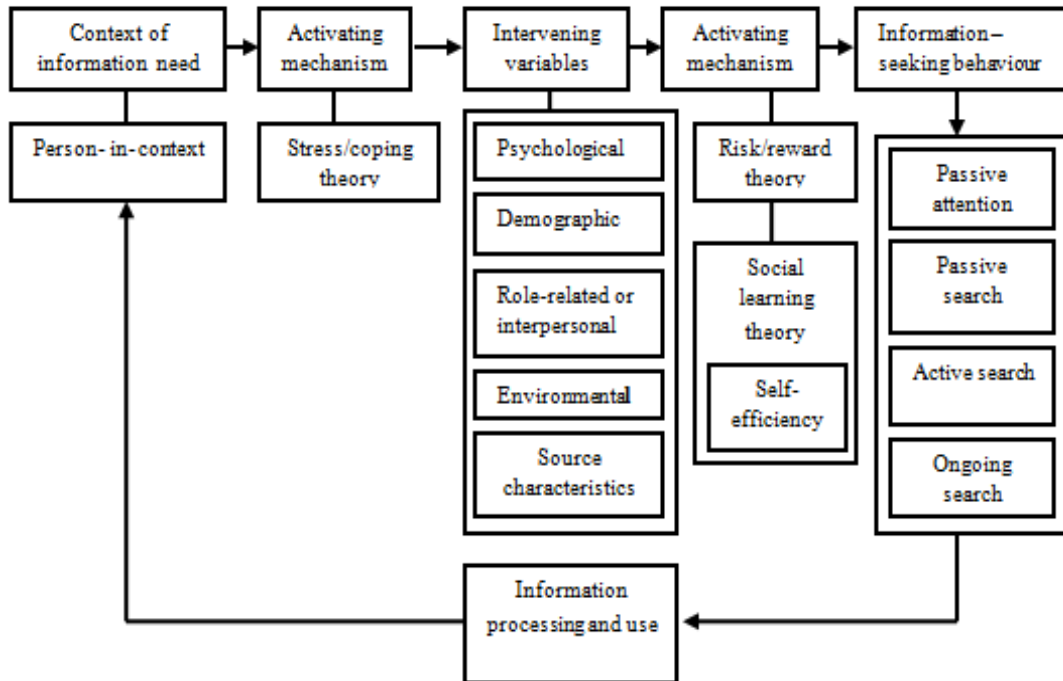


Figure-4.4: Wilson Model (1996)

(Wilson; 1999; pp. 249-270)

4.4.1.4 Dervin's Sense- Making Theory (1983, 1996)

The Dervin's sense-making theory has developed over a number of years and it cannot be seen simply as a model of information-seeking behaviour. She describe it as 'a set of assumptions, a theoretic perspective, a methodological approach, a set of research methods, and a practice.' designed to cope with information perceived as, ' a human tool designed for making sense of a reality assumed to be both chaotic and orderly.' In this model the sense- making is implemented with four elements: one element is situation which defines the context in which problems of information arise. The second element is gap, which identifies the difference between the contextual situation and the desired situation (e.g. uncertainty). The third element is outcome, that is, the consequences of the sense-making process, and the fourth is bridge which indicates some means of closing the gap between situation and outcome. The elements are presented by Dervin in the form of a triangle which is represented in the **Figure- 4.5**.

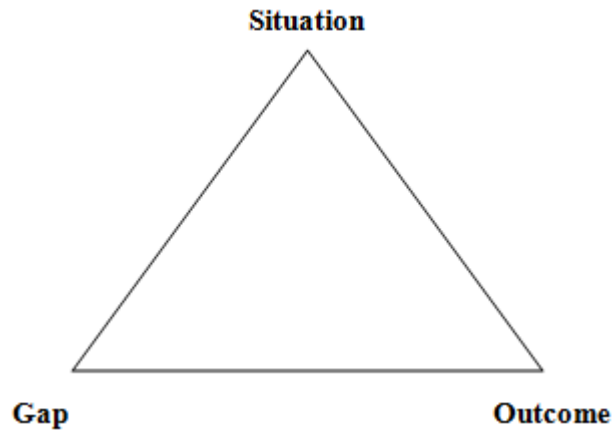


Figure- 4.5: Dervin's Sense- Making Framework

(Wilson; 1999; pp. 249-270)

Dervin later modified this model and preferred to use the bridge metaphor more directly and present the model as **Figure- 4.6** below:

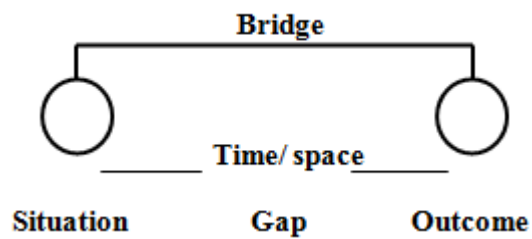


Figure- 4.6: Dervin's Sense Making Modified Framework

(Wilson; 1999; pp. 249-270)

4.4.1.5 Kuhlthau Model (1992)

	Initiation	Selection	Exploration	Formulation	Collection	Presentation	Assessment
Feelings (Affective)	Uncertainty	Optimism	Confusion Frustration Doubt	Clarity	Sense of Direction/ Confidence	Satisfaction or Disappointment	Sense of Accomplish- ment
Thought (Cognitive)	Vague	→ Focused			→ Increased Interest		Increase self- awareness
Actions (Physical)	Seeking	Relevant Exploring	Information	Seeing	Pertinent Documenting	Information	

Figure- 4.7: Kuhlthau Model (1992)

(Wilson; 1999; pp. 249-270)

The Kuhlthau Model was designed in the year 1992. It has following stages:

a. Initiation

The user becomes aware of an information need. Uncertainty and apprehension are common feelings at this stage.

b. Selection

In this stage the user identifies and selects the general topic for information seeking. The user experienced a brief sense of optimism and get readies for exploration of the information.

c. Exploration

This stage involves the seeking and investigation of information on the general topic. While exploring for information people will get doubt on the consistency of the information, confused on the compatibility and get frustrated in the stage.

d. Formulation

In this stage the user can able to focus on perception which leads to clarity and the process of seeking for information gets continued.

e. Collection

The process of information seeking, senses the right direction, information related to the focused perspective is gathered and it minimizes the ambiguity of the information.

f. Presentation

In this stage after the completion of the search it enables the user to put the information to use and present the knowledge to use.

g. Assessment

When the information seeker attains the required knowledge, seeker gets a sense of accomplishment and the self awareness increases.

4.4.1.6 Ellis Information Seeking Behaviour Model

David Ellis has listed several methods through which scientists seek information. These methods are related to the research activities of the scientists i.e. from the inception to the completion of the investigation. Based on these methods Ellis developed a behavioural model includes six features as describes below:

➤ **Starting**

This involves information-seeking activities connected with the initial stage of research. The activities include:

- Personal contact;
- Consulting reviews or review type materials;
- Consulting secondary information sources such as indexing and abstracting periodicals; and
- Consulting computer based services.

➤ **Chaining**

This involves connecting of references – i.e. the following of citations through documents. It includes “backward chaining” where an attempt is made to find the original author/source, and “forward chaining” from known items through citation indexes.

➤ **Browsing (Cava reading)**

Here, the Scientist searches for information in areas of potential interest. The Scientists browses through computer abstracts and alert services such a SDI (Selective Dissemination of Information Services) etc. in that area.

➤ **Monitoring**

The monitor is to keep watch over something. The Scientist maintains awareness about developments in his area or field through regular scanning of particular sources- journal, abstracting periodicals and current contents, etc.

➤ **Differentiating**

This is the type of filtering system whereby the scientist differentiates between sources to find out their substance of study, the perspectives or approach adopted by them, the type, quality or level of treatment given by them to information.

➤ **Extracting**

In this method the scientist systematically works through a source to locate materials of interest.

➤ **Verifying**

Certain people may accept a source at face value without donating. Others may require verification. Scientists resort to verification a lot.

➤ **Ending**

This includes all information seeking activities relating to the last stage of the research project. The figure- 4.8 is the Ellis model.

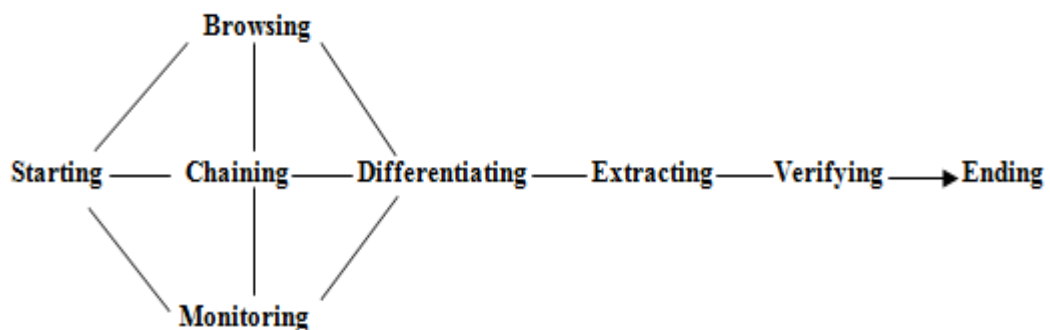


Figure- 4.8: Stage Process Version of Ellis' Behavioural Framework (1993)

(Wilson; 1999; pp. 249-270)

4.4.1.7 A comparison of Kuhlthau and Ellis' Models

To complements Ellis' model (1997), Kuhlthau attached the associated feelings, thoughts and actions, and the appropriate information tasks in the form of different stages (Wilson; 1999; p. 255). Kuhlthau's model is more general than Ellis' model. Kuhlthau's model in effect postulates a process of gradual refinement of the problem area throughout the information searching process (Wilson; 1999; p. 255-256). Kuhlthau's longitudinal study also supports the views that information seekers are learning during information-seeking and that their information needs are dynamic. The figure- 4.9 represents the comparison model of Ellis' and Kuhlthau.

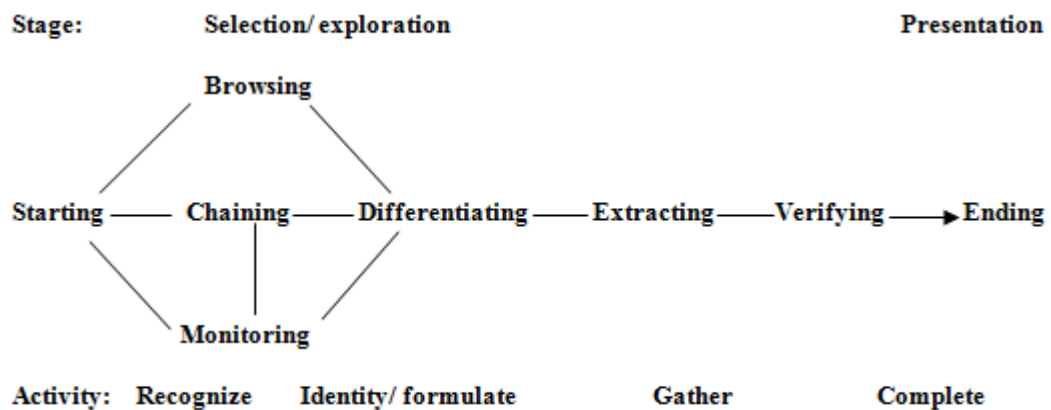


Figure- 4.9: A comparison of Kuhlthau and Ellis' Model

(Wilson; 1999; pp. 249-270)

4.4.1.8 Nested Model

In 1999, Wilson designed and developed a nested model of conceptual areas, which reflects the interrelation of the concepts involved in information seeking behaviour which is illustrated in the figure- 4.8. From the figure it is clear that information behaviour is considered to be more general field of investigation and information-seeking behaviour is a sub-set of the field which is particularly concerned with the variety of methods employ to access information resources. The information searching behaviour is the sub-set of information- seeking, particularly concerned with the interactions between information user and computer- based information systems.

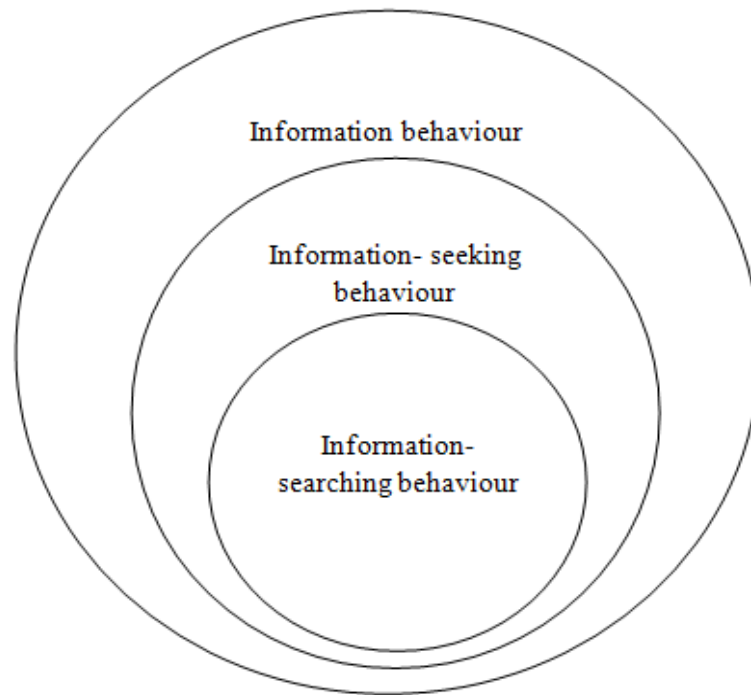


Figure- 4.10: Nested Model

(Wilson; 1999; pp. 249-270)

4.5 INFORMATION USE PATTERN

The Pattern is a composite of traits or features characteristic of an individual or a group: one's pattern of behavior. The "Use Patterns" are perhaps one of the most effective methods of understanding the information requirements of the scientists. It is mainly concerned with how and from where a user (in this context, a scientist or an engineer) gets his required information. It is a human behavior relating to searching various sources of information either through formal, informal or inter-personal sources. In other words, the process of searching and using information through various channels of communication is termed as 'Information Use Pattern'.

Information use pattern is the path pursued by the individuals in the attempt to resolve a need. The library scientists like Marquis and Allen have suggested that information use is behaviour and data are collected on any behaviour by asking people about it, by observing its occurrence or by examining its artifacts. In other words,

information use is the seeking behaviour, which leads to the use of information in order to meet the individual needs.

To create information and to promote use of information, it is necessary to know the needs of users. Research and development institution, are the place where knowledge is being generated as a result of research activities undertaken by them. Creating and using scientific knowledge are imperative components of the activities of scientists. According to an estimate, a working scientist spends one third of his time in searching for information and the cost of this search represents one fifth of all the money allocated to science. The effective utilization of the information generated in the field of science and technology due to R&D efforts has been recognized as essential for the socio-economic development and technological progress. The most important factor influencing the scientists is the type of work in which he is engaged. The scientists engaged in R&D activities are in need of information for the following purposes:

- ➔ To aid in perception or definition of the problem;
- ➔ To formulate the scientific or technical solution;
- ➔ To place work in proper content with similar work already completed;
- ➔ To relate work to the ongoing project in the concerned area; and
- ➔ To integrate bindings into current state of knowledge in the related area.

Now, successful storage and retrieval of the exponentially growing body of scientific information is quickly becoming dependent upon the Internet. The way in which scientists seek information to support teaching, research and creative activities is changing as new technologies as information delivery system emerge. To keep abreast with current developments in their field , scientist still depend on the age old methods i.e., scanning the current issues of journals, attending conferences and also on using current awareness services such as current contents available on desk-even accessing them at their own cost if they own cost if they are not available in their libraries.

4.6 CONCLUSION

This chapter mainly discusses about the concept of Information need, User studies, Information- seeking behavior, different models of Information- seeking and Information use pattern. The above study also suggested that the primary goal of science libraries now should be to obtain access to as many appropriate electronic bibliographic findings aids and databases as possible. At the same time, to ensure that the library attracts information literate users, the availability of such tools should be publicized and subsequent instruction in their use should be given. Now scientists not only use printed information sources but also access electronic resources. Scientists found more suitable for accessing electronic resources because it can save their time by providing required information instantly. Consortium, online databases, e-journals, e-books, e-patents, e-standards, e-theses and dissertations, open access journal are the electronic sources of information that scientists prefer more for accessing their desired information. The next chapter (**Chapter- 5**) of the study was a theoretical perspective of the brief profiles of the CSIR Laboratories of Northeast and Eastern India and their Knowledge Resource Centre's (KRC's).