Chapter 3

Information Generation and Its Use

Communication is an all pervasive activity and constitutes an important and integral part of all types of studies, research and development endeavors. In this communication, receiving and disseminating information through formal and non formal channels are the continuous activities. Information is the major components in this communication. In any kind of communication system in which information plays provital role - knower, knowee, language, massage and medium, are the major pillars. Every pillar has to perform its own role very effectively and efficiently to become the communication system successful. The total process of this communication is extremely complex and involves several different group of people communicating several channels using variety of media and methods.

Information is generated for use, primarily for social, economic, cultural development. During the process of generation of information new information is generated continuously. This entire activity is a continuous and never ending phenomenon. In this process generation, transfer and use, are the major activities. Generation is done through study and research. Authors, speakers, researchers are doing this job through their study and research. Transfer is the second activity done by communication and dissemination. In this process library is one of the agencies that plays effective role. The third process that is use, done by assimilation of knowledge by human agencies for the regeneration of new information. It appears to be a spiral system. In this spiral many phases are playing major role. These phases are generation, recording, dissemination and utilization. It means that in the
transmission or flow of information, generator or creator and the users of the
information are two extreme poles. In between these extreme poles so many phases
are there. In the transmission of information these phases with its characteristics are
studied by many eminent personalities. Such studies and the models developed by
them are to be discussed to know the entire structure of transmission of information.
Accordingly the researcher has discussed such a models developed by Dr. S.R.
Rangnathan, P. A. Lignomenides, K. Subramanyam and R. Subbaiah in this chapter in
forthcoming paragraphs.

Studying the various phases comes in the process of transmission of
information between two extreme poles is not sufficient. Everybody recognized the
value of the information in this era of information based society. Only getting and
acquiring information is not sufficient and having not any value, if it is not get in
time. It means that in the transmission of information through various phases the time
factor is very much important. Library is the major agency that acts as a disseminator
of information in the process of transmission of information which is available in
documentary form. It is the responsibility of library to reduce the gap between the
two extreme poles i.e. creator and the users of the information. If it takes time to
transmit the information between the two extreme poles then it is to be examined why
it is happening so? As stated earlier many poles are actively performs its job in the
transmission of information that comes between two poles creator and user.

As far as time factor is concerned it takes certain periods to pass through each
poles. Many eminent personalities have studied the process of transmission of
information in terms of time. These studies and models developed by W. D. Garvey
and B. C. Griffith; R. H. Orr and E. M. Crouse; J. Carson and H. V. Wyatt; C. G.
Roland and R. A. Kirkpatrick; T. F. Sondergaard, J. Andersen and B. Hjorland; Balarama are also discussed by the researcher.

During the process of research new knowledge is generated. The entire gamut of activity is continuous and never ending phenomenon. Knowledge is generated from information. Information is flow of message, while knowledge is created by that very flow of information anchored in the beliefs and commitment of its holder. When value is added to information by people out of his own creation, knowledge is generated.

Knowledge is the relationship between the knower and knowee whereby the facts, truths and principles get established. From the time of the "Big Bang" man has been developing his knowledge about entities around and within him. Numerous theories concerning knowledge have emerged since ancient era from the Orient, Greece and other regions of the world. The Vedas, Plato and Aristotle, St. Thomas Aquinas and Dante, scholastic, philosophers, scientists and other all have dealt with knowledge and its characteristics of various kinds. The acquisition of knowledge by man has obviously been through his senses. During the ancient era, the acquisition was largely through trial and error where important roles were played by chance, magic superstition, supernatural concepts, tradition, authority, religious institution etc. The tools of deduction and induction were the second set of modes of acquisition of knowledge that emerged.

Language, record and other forms of communication across space and through time make it possible for mankind to cumulate one another's knowledge and add to it co-operatively either in a systematic or in a casual way. Universe of knowledge is the sum of such cumulated knowledge. It is being continuously developed and added to it. Different domains of the universe of knowledge are developed by different
methods. The process of information flow is neither one way nor does it have definite "beginning" or "end". Ideally, the flow of information between the components includes forwards linkage as well as feed back. Research results are important to the scientist who performs research. According to Dr. Ranganathan scientific method makes intellection pursue any discipline perpetually round and round a never ending succession of cycles. The endless spiral of scientific research propounded by Ranganathan in his study spiral of scientific research.

**Ranganathan's Study on Spiral of Scientific Research**

Scientific method is characterized by never ending spiral movement. The cycle implied in the spiral will be followed in the clockwise direction. For convenience of reference the four cardinal points of the cycle are denoted by terms Nadir, Ascendant, Zenith and Descendent. The Nadir marks the accumulation of facts, obtained by observation, experimentation and other forms of experienced. The Ascendant marks the accumulation of inducted or empirical laws got out of the facts accumulated at the nadir, by inductive logic including normal equations and other aids from statistical calculus. The Zenith marks the fundamentals laws formulated with the aid of intuition of some degree or other so as to comprehend all the inducted or empirical laws accumulated at the ascendant as compelling implications. The Descendant marks the accumulation and deducted laws got from the fundamentals laws at the Zenith, with the aid of deductive logic including general semantics and all kinds of mathematical calculus.

The four cardinal points give rise to four quadrants in the cycle implied the spiral. In figure 1, spiral in case of social sciences, unfavorable factors prevail in all the three quadrants. Observation is vitiated by the observed entity being man himself
with all the obstructions which his mind causes. Experimentation is difficult, if not impracticable and even where it is attempted, it takes several decades to collect adequate data, on account of the large span of each generation and of the low rate of multiplication.

The spiral of scientific method begins the next cycle thereafter, by reentering quadrant one. Two things happen at the stage of development corresponding to quadrant one in the new cycle.

1) Observation and experiments are made to verify empirically the validity of new deduced laws and;

2) Further observations and experiments are made continuously and this leads to accumulation of new empirical facts.

Research and development of knowledge depends on types of thinking of mankind.
Once upon a time the human thinking was largely on supernatural lines or on natural lines. Then it becomes either deductive or inductive in style. With the merger of deduction and induction, the various cultures, even in modern times, have kinds of thinking which could be classified as circular thinking or linear thinking. While participating in international conferences one cannot avoid realizing that a majority of scholars from the west, feel that oriental thinking is circular, hence repetitive, while the occidental thinking is linear and hence progressive. One may not like to enter into this controversy. However, if older concepts are reviewed in the light of newer facts and knowledge and are regulated accordingly, some modified concepts will result which in turn will contribute to the growth of new knowledge. This reciprocity of give and take will continue to result into a spiral mode of thinking, which one hopes, will be much better than the so called circular or linear modes of thinking. It is this spiral mode of thinking that is the base of Ranganathan's spiral of Scientific Research for application in all sectors of knowledge, not limited to Natural Sciences.

Panus A. Ligomenides's Study on Information Generation and Usage

'Information' is an entity apart from the means by which it is processed, from the carriers by which it is transported, and from the symbols and forms by which it is presented. It involves additional domain of activity-that of 'symbolic' and 'form' of 'meaning' and of 'pragmatic value'. Information is that it is alive, it exists only in human mind and, as such it is both the input and output of human perception is discussed by Panus A. Ligomenides.

The figure depicts the physical, natural processes present in the symbolic space in various forms that are sensed, recognized, accepted / rejected, classified and interpreted for relevance in semantic and pragmatic terms by the human brain. These
further through reasoning and decision making result in more forms recognized as information after abstraction into experimental and expert knowledge.

The natural process of creation of information through human brain and various steps occur during the process is very systematically presented by Legomenides in his model generation of information and use in 1985. The flow chart of the model is given in fig. 2.

This cyclic nature of information generation and usage depicted that information is created in human mind through various forms that are sensed and recognized. Then through sensory perception researcher accept required information and classify it through filtering the senses information and rejected garbage information. Next step is abstraction and identification of accepted information through decision making and information generated. Again this new generated information reuse by another researcher.

Fig. 2 : Generation of Information and Usage. (Ligomenides, 1985)
K. Subramanyam's Communication Model

Communication is an all pervasive activity and constitutes an important and integral part of research and development endeavor. Roughly, one half of the working time of scientist is spent in communication activity: Receiving and disseminating information through formal and non formal channels. The total process of communication is extremely complex and involves several different groups of people communicating several channels using a variety of media and methods. The model suggested by K. Subramanyam, as a didactic tool in analyzing the complex process of science communication and identify its various phases and components.

Science communication means the process of information transfer within the community of scientists and engineers engaged in scientific research and technological innovation.

The process of communication consisting of four principles or elemental phases recurring in succession. These phases are Generation, Recording, Surrogation and Dissemination and Utilization of information. In actual practice, these overlap and merge into a complex and continuous streams of communication activity. One cycle consisting of the four phases is shown in fig.3. The total process of communication may be thought of as an endless succession of such cycles, the output of the last phase of one cycle becoming a part of the input for the first phase of the succeeding cycle as shown in fig.4.

The four phases come in the process of communication model suggested by K.Subramanyam are discussed below.

a) Generation

New information created by scientists and engineers engaged in research and development activity. This could result in the augmentation, modification or refutation of prior knowledge. The product of research effort are usually new concepts of theories, or new data processed for ready use. These constitute the material for dissemination and use in the succeeding phases of communication.
b) Recording

The new concepts, theories or data created in the first phase of the communication cycle are almost invariably recorded on some material medium before they are communicated. The recording is usually done by some people who generate the information i.e. the scientists or engineers performing research. Most often this takes the form of a manuscript to be eventually disseminated in the form published or unpublished reports, journal article, conference paper, patent, books or other similar document.

c) Surrogation and Dissemination

Before the actual dissemination of recorded information to its ultimate users can take place, the record has to be processed and duplicated, published and distributed. These activities are carried out by such groups of people as publishers, editors, printers, distributors, jobbers and retailers. Publishing and distribution may be done by commercial agencies. The objective of all the activities in the surrogation and dissemination phase is to promote and maximize the utilization of recorded knowledge by its ultimate users. This objective is sought to be achieved by attempting to disseminate information about documents and the documents themselves expeditiously, comprehensively and selecting in a format that is easy to use, store and retrieve when needed for further use.

d) Utilization

The assimilation of existing recorded information is a vital prerequisite for the generation of new information.

R. Subbaiah’s Study on Agricultural Knowledge Generation and Transfer

Knowledge is generated for use, primarily for social development. Knowledge
Fig. 3: Elemental phases in the communication process.

Fig. 4: The Spiral of Knowledge Communication. (Subramanyam, 1977)

G  Generation
R  Recording
S  Surrogation and dissemination
U  Utilization
is verified and tested through research. During the process of research, new knowledge is generated. The entire gamut of activity is a continuous never ending phenomenon. The key factors in the knowledge system are generation, transfer and use. Generation is done by research, transfer is done by communication and dissemination; use by assimilation of knowledge by human agency for the regeneration of knowledge. This appears to be spiral system. R. Subbaiah's model depicts this spiral for agricultural knowledge generation and transfer.

In this model scientific agriculture has two aspects: research and extension. Research generates agricultural knowledge and extension transfers the knowledge generated in the most adoptable form for use on land. The purpose of generating knowledge is to deliver technology which on transfer in the most adaptable form on land increases agricultural production. Problems are identified and technologies are developed by research for solving the problems and tested on the laboratories and transferred to land, where they are tried; again new problems are identified and new technologies are developed. Thus, there is a two way channel of information flow between land and laboratory.

In Fig. 5 four quadrants intercept the central point, that is, knowledge. Quadrant I is the area of author who record the knowledge generated through research. The intercepting points here are generation and transmission. Quadrant II is the area of publishers and distributors who use the recorded knowledge for editing, printing, publishing and distributing. The intercepting points, here are transmission and acquisition. Quadrant III is the area of library and information scientists who use the published knowledge for storing, retrieving and supplying to scientists through a variety of information dissemination services. The intercepting points are acquisition and supply. Quadrant IV is the area of scientists who use this knowledge for
conducting research for the regeneration of knowledge. Again the cycle enters Quadrants 1 and the regenerated knowledge is recorded by the authors. This again goes to publishers and distributors for transmission and again to library and information scientists for dissemination to scientists for conducting research. Thus this phenomenon is an unending spiral.

Fig. 5 : Conceptual Model for Agricultural Knowledge Generation and Transfer.
(Subbaiah, 1985).

Agricultural research at the point of generation gets feedbacks of problems through extension workers from farmers on land and sends back solutions through the
same channel of extension workers: the farmers use the processed information in their fields to maximize agricultural production. This phenomenon exhibits the two way information transfer from laboratory to land and vice versa. This is an extension phenomenon and has no direct role in the knowledge process. Therefore, it is shown as the outer orbit in the mode.

**William D Garvey and B.C. Griffith's Study on Scientific Information Exchange in Psychology**

W. D. Garvey and B. C. Griffith described time required for scientific information exchange in Psychology. The American Psychological Association has conducted a series of studies, the project on scientific information. Exchange in Psychology, which among other things, has traced the process from the time producers start the work that is ultimately to be reported in the journals until reports of it have appeared in secondary publications.

These findings could be organized in a number of ways. They present them by diagramming the courses of an average research report.

In this fig. 6, the four ovals viz. starts works, work reaches report stage, start writing work and submit to journals, each represents a significant points in the producer's work. The line connecting these four ovals also divides the figure into two sections. To the right side of the line, the possible forms of an oral reports of the work has given each indicated by rectangle. These forms are informal and formal reports. In informal report, rectangle indicated local colloquies, colloquia outside own institution and small informal conference. Similarly in formal reports, rectangles indicates special groups meeting, state Assign convention, Regional convention, National convention, Invited convention, International congress. To the immediate left side of line, possible
Fig. 6 The Dissemination of Scientific Information in Psychology (Garvey and Griffith, 1964)
forms of written reports has given, each indicated by rectangles. And thereafter left line the smaller category of forms of secondary publications and of index listing of the study has given. The ordinate on the left gives the median time of each form of dissemination relative to the time of journal publication, some exceptions being noted in the footnotes to the fig.6.

The entire figure is lightly shaded except for the small area that indicated forms of dissemination through which the information is generally available to the scientific public. All other forms, lying in the shaded area, have audiences which are to some, restricted. First there is a communication system which for the most part has been developed over the years by the scientists themselves to meet their information needs. This general system is composed of numerous elements (such as preprint exchanged, conventions, publications) and the elements within the system are dynamically related. That is to say, changes or growth occurring in one element affect, in some way and to some extent, the operation of other elements in the system.

Secondly, the dynamic nature of the system is a result of the behavior of the scientist within his communication network, that is, how he uses the various elements of the systems to satisfy his information needs and how he circumvents the restraints that the existing system places upon him.

The most striking feature of the process of dissemination in Psychology is how small a portion is easily available to the scientific community. Another feature of this system is considerable degrees of redundancy; the same persons receive equivalent forms of the information repeatedly. In particular, the informal means of dissemination tend to seek or be sought by the same people, apparently including a large number of active researchers. The absolute sizes of audience for journal and for informal means of dissemination suggest that the group that is really interested in particular set of findings is quite small.
Richard H. Orr and Eleanor M. Crouse's Study on Time Lag between Secondary and Primary Publication

In this study attempt has been made to follow information from its birth in a research laboratory until it is put to practical use or serves as basis for further research. For this study three areas of biomedical information Cardiovascular, Endocrine & Psychopharmacologic were chosen as rapidly expanding subject oriented research fields.

Oral reports presented at scientific meetings served as a starting point for tracing the fate of information resulting from research.

The next step in the metabolism of same information; the appearance of the information, originally identified as oral reports and later as published papers in abstracting and indexing services.

The average time-lag (months) between primary and secondary publication is given by the figure in the boxes. The horizontal solid bars represent the range between the shortest and the longest time lag for a given service.

C- Cardiovascular papers, E - Endocrine papers, P - Psychopharmacologic papers.

Fig. 7: Interval between Primary and Secondary Publication. (Orr and Crouse, 1962)
Fig. 7 summarizes the data on the interval between a paper's appearance in the journal (primary publications) and in abstracting or indexing service (secondary publications). The average time lag is given for BA (Biological Abstract), EM (Excerpta Medica), CA (Chemical Abstract), PA (Psychological Abstract) and CL (Current List of Medical Literature).

The objectives in this phase of the investigation were to determine the coverage of the selected subject fields by certain major abstracting and/or indexing services, the 'overlapping' in coverage among abstracting services and the average time lag between primary and secondary publication and to evaluate the potential of the tracer technique for studying secondary publication in operating defined field of research.

Orr and Crouse identified 240 published papers stemming from the original oral report and appearing in scientific journals by the end of 1959. These papers (89 Cardiovascular, 58 Endocrine and 93 Psychopharmacologic papers) were used in this study of secondary publication. 43 were published by the end of 1957, 109 in 1958 and 88 in 1959.

For both cardiovascular and endocrine papers, the interval between primary and secondary publication was about six months in BA and four months in CA. For an entry to appear in CL also required about four months in both of these subject matter fields, EM was considerably slower than the other services; the interval averaged eight-ten months.

With Psychopharmacologic papers the time lag differed. BA was more than three months slower with these papers than with Cardiovascular and Endocrine papers, CA was over a month slower, and EM was about two months slower. Even CL took somewhat longer to index these papers. PA, the chief abstracting service in
psychology, required an average of fifteen months to publish an abstract during the period covered by this study.

**J. Carson and H.V. Wyatt's Study on Delays in the Literature of Medical Microbiology: Before and After Publication**

The interval between acceptance and publication of an article is an average five months in medicine and nine months from submission to publication in Psychology. A further delay, which has received less attention is the time for delivery of a journal to the library or the delay before index or abstract publication arrive.

Carson and Wyatt studied the delays in the literature of Medical Microbiology: Before and after publication. For this study, fifty one journals were chosen which carried papers on Medical Microbiology. They were chosen as a cross section from the weekly journals such as Nature and the British Medical Journal through the core journals, to those which occasionally publish papers on Medical Microbiology.

The fig. 8 shows the delays before and after publication. The mean time between receipt and publication of an article was thirty five weeks. The range of pre-publications delay was fifteen to eighty nine weeks for articles in Cancer Research and Zeitschrift fiir Allgemeine Mikrobiologie respectively. Journals published in British and North America had slightly shorter delays than journals published elsewhere. The mean time of twenty weeks between acceptance and publication was the same as that for the interval between receipt of revised manuscript and publication. Revision time ranged from seven to thirty four weeks.

The time for British and North American journals to arrive in India was about as long as the internal between receipt and publication of an article. The time from acceptance (or receipt of revised manuscript) to publication was of course, shorter.
Journals titles are grouped according to country of origin. Shading of bars in ‘after’ publication side of figures is arranged in the same order as that given in the key. The practice of dating manuscripts differs many journals publish received for publication dates, others publish accepted for publication dates, and some publish both received and ‘accepted’ dates with each article. The date of receipt may be the original receipt date or the date of an acceptable version of the manuscript. Some journals give a date for the revised form.

Fig. 8: Delay in Publication and Delivery of Articles in Journals. (Carson and Wyatt, 1983)
Although there was less evidence for journals published elsewhere, a paper published in the Israeli journal of Medical Science reached the United States sixty three weeks after publication and about two years after submission.

**Charles G. Roland and Richard A. Kirkpatrick's Study of Time Lapse between Hypothesis and Publication in the Medical Sciences.**

The authors of scientific papers commonly complain about how long it takes to get their paper published and how outdated the published findings are. This publication delay has been studied for several fields. Charles G. Roland & Richard A. Kirkpatrick analyzed the various stages of publication process in an attempt to document the causes and actual duration of these delays.

Roland and Kirkpatrick investigates the time lapse between submission of a manuscript to the journal and publication date (journal time). Also studied the time needed to design and complete the research leading to the paper, the time requires to write it, and various author delays (Preparation time). To evaluate the total time between conception of the idea and its final flowering on the pages of scientific periodicals.

The most important aspect of this model is the documentation of the longer duration of the idea-to-research-to-paper-to-publication process. Research ideas at least four years old (and a few are much older) when they appear in journals. Authors commonly complain that the mechanical process of publication (editorial processing, proofreading, typesetting and printing) is inordinately long. They divided the total process of the birth, development and ultimate publication of a concept into eight phases. These phases are planning time, Research time, writing time, unexplained
delays (author), institutional editing, journal handling, revision time, acceptance (publication).

In fig. 9 illustrates the average total time for laboratory research papers was 49.5 months, for clinical research papers 47 months, for case reports 27.4 months and for review of articles 39.1 months.

Roland and Kirkpatrick suggested that the efforts should be made to reduce this time delay. For one thing the idea to research delay might be decreased if research money were easily available and secondly massive education of researchers on the principles of good scientific writing. Finally, the existence of a professional editorial department diminishes the number of revision necessary but if weaknesses can be found by an institution editorial department, changes can be accomplished immediately.

Fig. 9: Components of Time Lapse between Hypothesis and Publication (Number of papers in each category is given in parentheses.) (Roland and Kirkpatrick, 1975)
Trine Fjordback Sondergaard, Jack Andersen, and Birger Hjorland's revised and update UNISIST Model

This model offers an important sociotechnical perspective on the activities of scholarly communication. It draws attention to information communication between knowledge producer and knowledge user, shows the time perspective in knowledge production and use.

Sondergaard, Andersen and Hjorland revised and update the UNISIST model of scientific and technical communication published in 1971. UNISIST is an intergovernmental programme for co-operation in the field of scientific and technological information.

The UNISIST model was a product of four years of co-operation between United Nations Educational, Scientific and Cultural Organizations (UNESCO) and the International Council of Scientific Unions (ICSU).

For Library and Information Science the UNISIST model offers an important socio-technical perspectives on the activities of scholarly communication. It draws attention to information communication between knowledge producer and knowledge user, as a system consisting of diverse organizational and documentary units each contributing to the division of labour in scholarly communication.

Fig. 10 is a reproduction of the original UNISIST model (1971). This model was proposed as a generalized of the information structures within Science and Technology and of the organization of communication therein.

In order to discuss the model further in more detail in terms of its need for revision due to, for instance, technological innovations and diversity of various knowledge domains, and before discussing the updates of the model, a short description of the original model will be given.
Fig. 10: The Flow of Scientific and Technical Information (UNISIST, 1971)

The point of departure in the model is the knowledge producers. They makeup a multiform population organized in different groups or discourse communities implying that they have different patterns of information gathering behavior. The group of producers has three main categories of information distribution channels available for communicating research, it can be done through informal and formal communication channels, or through tabular channels.

It is further observed two levels of information sources between the knowledge producers and users: Secondary information sources and tertiary information sources.

The final unit in the model is users. The users of scientific and technical information are in most cases also identical to the producers. This is so because users
have different needs when acting as users and as producers. In this way the model is an idealization at this point.

An aspect the UNISIST model leaves out in its outline of scientific communication is the time dimension present in knowledge production and use. Garvey and Griffith (1964) emphasized in their study the relevance of taking this dimension into account when illustrating the activity of knowledge production. A somewhat simplified version of their model is shown in fig. 11.

According to this model the average time from the initiation of a research project until formal publication in a scientific journal is three years. One year later a bibliographic record in the abstract databases can be found. Gradually the research findings are visible in reviews articles, cited in other publications, mentioned in specific text etc.

Fig. 11 : The Time Perspective in Knowledge Production and Use. (Sondergaard, Andersen and Hjorland, 2003)
The improvements and extension of the model is light of the internet; in so far as this has an impact on scientific and scholarly communication, also discussed during this study.

The growing use and impact of internet based communication channels has changed the flow of scientific communication vitally since the creation of the UNISIST model. A technological updating of the model is therefore an absolute
imperative. The special prospective of the UNISIST model implies that other proposed models of electronic documents and scholarly communication put forward.

As shown in Fig. 12, the Internet as a media does in fact include some kind of representation of nearly all the diverse organizational and documentary units presented in the original UNISIST model.

The flow of scientific communication is in a transition phase where both the computer mediated communication and well-established traditional communication system (the left side of Fig. 12) is often used for much the same purposes. Fig. 12 must embrace both more traditional communication channel (displayed at the left) and the later computer based communication channels (displayed at the right).

**Balarama's Study on Factors Responsible for Quick Transfer of Information**

For the scientist to be abreast of his times in his field of activity, he needs to be informed most effectively. To do so calls for a system of information services that should provide the scientist with pertinent information as soon as it is available. The system, simple as it appears involved at least four parties, who bear the responsibility for quick dissemination of information from the sources to uses. The four parties are Author, Editor, Publisher and Documentalist who form the connecting links in the information transfer chain.

Balarama discussed as 'Responsibilities of Authors, Editors, Publishers and Documentalist in Quick transfer of Information. This study indicates the vital necessity and importance of quick transfer of published information.

Several people are involved in the processing of information right from the creation thought, the author, and the various agencies in between author and the actual users. The entire information process is chain. This chain shown diagrammatically in figure 13. The ultimate aim of this procedure is to connect the user to the proper
information as quickly and effectively as possible. It is therefore becomes apparent that people involved in this chain bear equal responsibilities for quicker dissemination of information.

![Information Transfer Chain](image)

Fig. 13: Information Transfer Chain. (Balarama, 1967)

In all above models the cyclic nature of information production were included Authors, Editors, Scientist, Publishers, Planners, Managers of Information systems and Networks, Computer programmers, Statisticians and so on as many of them generating new information. They played different role in information cycle.

Author is the creator of information or of messages. Author may be individual, an organization (corporate body) or an unidentified author i.e. an anonymous document. Author requires their work to be visible to the scientific and technical community.

The editor is the person responsible for a publication that groups together the contribution of several authors, with or without one from himself. The publications are termed as collective works. their role is to help accomplish the joint mission of authors and publishers, to produce an information product that users will want.
Primary Publishers manage the process of bringing authors work into usable form and distributing it to users. Secondary Publishers/ Database Producers have played the role of enabling users to access the published information of a field. Their role is increasingly shifting from the conventional Printed Products, such as abstracts, indexes etc. to the online made and full text material.

Authors send to users draft reports, reprints of their papers published through primary publishers, who supply their publications direct to users or to libraries. Primary publishers also supply their publications to database producers, who in turn supply their printed products or SDI services to users or to libraries.

Libraries are termed as treasure house of knowledge. Through varied in nature, they collect, organize and preserve documents and make them available to users through reproduction of documents, retrospective searches, referred and question answer services, etc. They also serve as a venue for lectures exhibitions and other events. Depending on their nature and the role they play in the information cycle, of higher education, are concerned with information. Academic libraries are located in the Universities and Institutions provision through normal library services. Established to support the scientific and technical information of the scholars, students etc. they also publish thesis, University's on going research activities etc.

The user is the focal point of all the information systems. The concept of 'User' though unclear, points out that he is both consumer as well as producer of information.

In this way information generation, storage, disseminations and utilization is an unending cycle.

After studying the above models it is observed that, Dr. S.R. Ranganathan, Panus A. Ligomenides, R. Subbaiah and Balarama, have discussed the online process
of genesis to proliferation of information in their respective models. The key factors in process of all these models are author, editor, publisher, library & information centers and end users. The information transfer from its released to its publication required certain time. This time period studied by many eminent scientists in different disciplines.

However, in this journey of process, the library has to play provital role in dissemination of information. When information published and reach up to the end users it required certain time. Collection, organization and dissemination are the major functions to be performed by the library in between generation of information to its dissemination. The researcher has collected data regarding the factors responsible for the time lag from acquisition of information in the university libraries to its dissemination. Hence the researcher has highlighted on acquisition policy of university libraries which are considered for the study and at the same time the policy regarding dissemination of the information of the new arrivals is also studied. This is discussed in next chapter titled. 'Acquisition Policy of University Libraries in Maharashtra.'

In this chapter the results and interpretations of several empirical studies of entire process of genesis to proliferation of information undertaken by the scientists are discussed. Several other investigators have studied time required for publication of information in terms of primary and secondary sources. The study of all these scientists summarized already in this chapter. These studies, however, not discriminate time require for publication of information to its use. The purpose of the study is to design the theoretical model of the utilization of an information very first time once it is being published.