

## CHAPTER 2

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# *Review of Literature*

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### **2.1 Introduction**

To study to previous literature, (which are related to the present study) various forms of literature search were undertaken. The searches of literature initially start with the construction of a Mind Map which leads to generate large range of keywords that could be used as search terms. This can be shown schematically below.

#### **Community**

*Scientific Community*

Student

Research Scholar

Faculty Member

#### **Education**

*Learning methods*

*Learning styles*

#### **Research**

*Disciplines*

Scientific

University

Library Users

*Survey Methods*

#### **Efficacy**

*Information literacy self-efficacy*

*Computer efficacy*

*Confidence*

**Data analysis**

*Percentile*

*Chat*

*Chi-square*

*Correlation*

*Regression*

*Critical incident technique*

**Student Community**

*Graduate*

*Masters*

*Doctoral*

**Faculty Members**

*Professor*

*Associate Professor*

*Assistant Professor*

**Information science**

*Literature searching*

Information retrieval Pattern

Information Access

Information Use Pattern

*Information seeking behaviour*

Models

## Information searching behaviour

### *Information literacy*

Informatics

Information needs

Information systems

Databases

*(NB: Some of these terms have been rephrased to reflect the preferred terms)*

For searching the literature, it was started by using the broad terms in printed or electronic media, as this led to the more appropriate term. For printed document, searching started with various documents within or outside the library by searching in index and contents. But for e-resource, after key terms are found more targeted search can then be performed to refine the search strategies. Some of the chosen terms were combined using Boolean or proximity operators in electronic documents.

The purposes of the present literature review are:

- To understand the problem in the related study;
- To identify gaps and interpret the ways to further study;
- To avoid duplication of well-established findings; and
- To understand the latest developments in the field of study.

Literature published during 1961- 2015 have been consulted from various sources such as journals, conference/seminar proceedings, e-journals, other articles from various academic websites, chapters in the edited volumes, etc. Databases used to locate pertinent information are:

Library and Information studies related:

*LISA (Library and Information Science Abstracts);*

*Indian Library Science Abstracts (ILSA);*

*IASLIB;*

*DESIDOC.*

Science related: *Web of Science.*

General/ Others: *Emerald journals;*

*UGC-INFONET;*

*Indian journals;*

*Directory of open access journals;*

*J-GATE;*

*Open Access of Thesis and Dissertation;*

*OALib journals;*

*Directory of Open Access Books.*

The following journals were also either browsed or consulted in some aspects:

*Education for Information;*

*Information Sciences;*

*Information Society;*

*Information Technology and Libraries;*

*Journal of Computer Information Systems;*

*Journal of Information Science;*

*Journal of Librarianship and Information Science;*

*Library and Information Science Research;*

*Reference Services Review.*

## **2.2 Scope and Coverage of the Review**

The present review has covered 217 (two hundred and seventeen) literature which are directly or indirectly related to the topic under study. A numbers of

literature reviews were carried out to know the information seeking behavior and status of reader/ users. But due to the tremendous growth in the output of information, readers are unable to survey all the literature that is relevant to their field of expertise (Maizell et al., 1971, p. 2; Salager-Meyer, 1990, p. 366; Cross & Oppenheim, 2006).

But, as per the mindset of the key term, various literatures were reviewed as per the main common factors. Review of these studies has been covered different aspects of the user's study which have been divided into the following groups.

### ***2.2.1 Review of Literature Related to Information Seeking Behaviour***

Various literatures were found related to the information needs and information seeking behaviour.

In a comparative study on Scientists and Social Scientists, Skelton (1973) has shown that Scientists and Social Scientists used the same information sources and followed similar method to retrieve information and they did not differ to any large extent in their information seeking behaviour. Scientific or scholarly communication in academic settings is a system with the exchange and sharing of information as its main function (ALA, 2006; Xia, 2006; Khosrowjerdi & Alidousti, 2010).

Such communication is integral to the day-to-day academic activities. This is evident in the fact that almost every scientific article refers to other parts of the literature. Such scientific article or communication plays a major role in science and technology, by contributing to the expansion of knowledge and acceleration of the process of science application; without which development of science could never be accomplished (Hanson, 1973, p. 13; Riyahi, 1995).

Further, synoptic view has been presented by Neelameghan (1977); while studying on information needs and information sources of small enterprises discussing

problems while providing and accessing information. The study has shown that information services like referral services, current awareness services and specialized services are helpful to the entrepreneurs. Relating Information needs to learner characteristics in higher education has been studied by Ford (1980) which identified information handling skills, assessment procedures, information accessing system as needed for accessing to wide range of information sources. Salman (1981) in a study has provided the conclusion of the analytical case-studies on information needs of the eight developing countries of the world namely-Columbia, Costa Rica, Jordan, Kenya, Republic of Korea, Malaysia, Morocco and Nigeria.

Sasikala (1994) examined the information seeking behaviour of managers working in twenty different industrial organizations of Andhra Pradesh. The result of the study has shown that senior and middle managers used information more than the junior managers. The survey has also shown that the managers occasionally visit Libraries and they tried to satisfy their information needs from other sources. Sridhar (1995) conducted a study on the user characteristics ranging from internal or external to individual, sociological, demographic, with their various role and status. In the study she also described user productivity, creativity, motivation, interested subject area. Kanungo (1997) tried to take an attempt to investigate the methods of seeking information by the women researchers in the disciplines of history and political science in the University of Delhi and Jawaharlal Nehru University. The study led to comparative analysis of the methods adopted by researchers in finding, accessing and acquiring information. In 1998 Bruce carried out a study on uses the Internet to seek information and how much they are satisfied with this channel that is internet. The results had shown that majority users used the Internet for information seeking at least once per month.

Fidzani (1998) conducted a survey among students to determine the information seeking behaviour and use of information resources by graduate students at the University of Botswana. The purpose of the study was to find out what were their information requirements and to determine their awareness of library services. The findings of the study indicate that the guidance in the use of library resources and services would be provide to help students to meet their information requirements. Fabritius (1999) discussed the information seeking behaviour of journalists in the process of data gathering. The study described the various channels through which information was sought and how the interaction between the research setting and methods applied took place.

Further, Fidel [et. al.] (1999) conducted a study on the information mall, web searching behaviour of high school students in order to analyze the web searching behaviour homework assignments of high school students at West Seattle high School, Seattle. The result of the study has shown that the students enjoyed searching the web because it had a variety of formats, such as pictures multitude of subject and easy access to information. Keshavarz (1999) stated the concept of human information behaviour and to explore the relationship between information behaviour of users and the existing approaches dominating design and evaluation of information retrieval systems. The findings from studies on information behaviour of users were rarely incorporated into real information retrieval systems and services. There must be work undertaken to consider the information behaviour implications in the design and evaluation of these systems as it is a critical factor. The studies being conducted has shown a future in the area of system design and evaluation in which humans and systems were well adapted together and the systems serve as extensions to human memory. In the study, Voorbgil (1999) started search for scientific information on the

Internet by examine the usage and perceived importance of the internet amongst students and academics in the Netherlands. He distributed a detailed questionnaire to the academic community. The result of the study has shown that the use of the World Wide Web was done primarily to seek general, factual, ephemeral, or very specific information.

Herman (2001) examined the transition of information towards electronic information in academia and seeks to establish from the published literature. Reviewing a large number of studies in this paper, author investigated the integration of electronic media into academic work amassing the new technologies to scholarly information gathering endeavors. Hsieh-Yee (2001) carried out research on web search behaviour by reviewing numbers of the studies conducted between 1995 and 2000 on Web search behaviour. It has shown that users gain more experience with the web, their need will expand the growth of the amount of information on the web has affected information seekers' use of the web. It has also shown that majority Internet users search the web each day and searching is the most popular activity after e-mail.

Laloo (2002) explained the term information, information needs, information seeking and described why information is essential for user. He also explained what type of information was needed by what type of user and for what purpose. The book also explains the impact of information in the user's life on technology transfer. Further, Majid and Tan (2002) investigated the information needs and information seeking behaviour of computer engineering undergraduate students at Nanyang Technological University, Singapore. The study has shown that the use of databases and electronic journals was quite low. In the study, Whitmire (2003) discussed on which explores the relationship between undergraduate's epistemological beliefs and their information-seeking behaviour. Kuhlthau's information search process (ISP)

model and four other models of epistemological development from educational psychology formed the theoretical foundation of the investigation.

Sinha (2004) conducted a study on the scenario of Internet use pattern of Assam University community and local population of Barak valley. In this study he described the usefulness and advantage of Internet in day-to-day life, impact of Internet on the library and information services etc. Patitungkho and Deshpande (2005) conducted a study of the information seeking behaviour of faculty members of Rajabhat Universities in Bangkok, Thailand. The results have shown that most of respondents stated their method of seeking information by consulting a knowledgeable person in the field. Majority of them seek information for preparing lectures. 'Google.com' was used for searching information by respondents at most of cases. Malliari and Kyriaki-Manessi (2007) conducted a study on user's behaviour patterns in academic libraries and OPACs in relation to user profile. The results of the study have shown that the faculty members seem to have a clearer idea of what they are looking for. Further, the study helped to find out users' behaviour regarding the OPAC will help the Library to re-establish its policy with the target in mind of ameliorating as well as expanding its services.

Chiwari and Dick (2008) carried out a study on information needs, information seeking patterns of small, medium and micro enterprises in Namibia. This study has shown that small, medium and micro enterprises need information on finance, marketing, training, product and business services which are basically informal. Further, Fatima and Ahmad (2008) investigated the information seeking behaviour of college students to find out the awareness and usage of library resources. The findings of the survey indicated the need to increase the usage of library resources and services. Kellar (2008) conducted a study on user behaviour during

Web information task in order to understand the characteristics of information seeking tasks on the web. The result of the study has shown several differences in how users interacted with their web browser and gather the information which takes longer time than the fact finding tasks but both were search-based with the heavy use of Google. Kim and Chung (2008) carried out a study on personal recommendation service (PRS) involving an innovative hybrid recommendation method suitable for deployment in a large-scale multimedia user environment. The findings of the study revealed that in retrieving relevant content, the proposed system does not use the user's demographic information, neither the attributes of contents, instead, it would use the usage frequency of contents to analyse the user's behaviour patterns online on available contents. Leykam (2008) explored the interlibrary loan usage patterns and liaison activities in US university. The results of the paper have shown that usage patterns can accurately illustrate trends in the borrowing behavior of patrons in order to gain a better understanding of their needs.

Nicholas [et al.] (2009) carried out a study to provide evidence on the actual information seeking behaviour of students in a digital scholarly environment. The study has shown that the undergraduates and postgraduates were the most likely users of library links to access scholarly databases, suggesting an important hot link role for libraries. Veeranjanyulu and Lakshmi (2009) conducted a study on the information needs and information seeking behaviour of under-graduate students of S. V. Agricultural College, Tirupati. This study has shown that the majority of the student did not satisfy with the library timing and majority of them did not visit other library. The study also highlights the requirement of library professionals especially professional who are having the knowledge of agriculture. Xie (2009) carried out a study to investigate how dimensions of tasks affect the information-seeking and

retrieving process. The study identified the nature, stages, and timeframe as dimensions of work tasks as well as origination, types, and flexibility as dimensions of search tasks that affect information-seeking and retrieving processes.

In a study, Bhatia and Rao (2011) tried to find the problem faced by students on the information seeking behaviour at Devn Samaj College, Chandigarh. The findings of the study has shown that the majority of the students found that limited access to computers being the problem to use e-resources and they indicated their willingness to get trained to learn more about using the Internet and e-resources. Bhattacharjee, Bhattacharjee and Sarmah (2011) had conducted a study to find out the use and familiarity of e-journals through N-LIST consortium to the users of college libraries of Cachar District, Assam. In this study, they tried to highlight the position of the college libraries as well as satisfaction level of user community such as students, teachers and staff. It was found that majority of them were unknown about e-consortium. Biswas and Choudhury (2011) carried out a study on role of information needs in various colleges of South Assam. The results of the study have shown the types of information needs of the college's library users of South Assam and how library users were facing problem with the various collections of those libraries. Singh and Kaur (2011) conducted a study of physical challenged students and faculty members of the University of Delhi. The results of this study have shown that the first three preferences given by the faculty and students for seeking information are textbooks, periodicals and newspapers. The visually challenged students mostly used computer with screen reading software JAWS as an assistive tool for study purpose.

Sinha (2012) conducted a study to know the extent of Internet literacy among the university library users in Assam University library. The results have shown that the younger generation has accepted the Internet as a means for accessing to the

relevant information for academic and research works, whereas the elderly people are still comfortable with traditional resources who are using printed resources available in library, but the volume of frequent usage of e-resources among the users have been found to be at optimum level. In 2013, Catalano analyzed the patterns of information seeking behavior of graduate students, which revealed that graduate students begin their research on the internet much like any other information seeker (Catalano, 2013).

Further, Huang, Chen and Ho (2014) tried to identify significant differences between tablet reading systems of Apple iPad with iBook platform and other digital reading systems. This study extracted the context of use and behavior patterns of tablet reading systems. Those findings were served as a basis of research helpful to later designers and researchers who will develop tablet reading systems.

Sinha (2015) conducted a study on information needs and information seeking pattern of public library users of Barak Valley, South Assam. The study has shown that very poor condition of public library system of that place. Koo, Chung & Kim (2015) investigated the effects of user competence on two different usage variables related to information systems infusion explorative use and exploitative use. The findings of the study illustrated the relationship between exploitative use and explorative use.

Further, many studies related to information needs, information seeking patterns were carried out at outside the India; some of very important finding was described in studies related to the development of information searching pattern in US (Fabritius, 1999), Singapore (Majid & Tan, 2002), Bangkok (Patitungkho & Deshpande, 2005), Namibia (Chiwari & Dick, 2008), Nigeri & Eze, 2015), European Union(Tanackovic, Horvatic & Badurina, 2015). In majority cases, it is found that

there were tremendous changes in Information seeking pattern among various categories of users.

### ***2.2.2 Review of Literature Related to Information Seeking Model***

There are several kinds of conceptual models for information seeking behaviour. Generally, these models provide guidance in setting research questions, and formulation of hypotheses (Jarvelin & Wilson, 2003). Wilson (1999: 250) noted that the concern of the models of information behaviour among theoretical propositions. This extends Järvelin's (1987) discussion on criteria for assessing conceptual models. Jarvelin's suggestions led to empirical study (Byström & Jarvelin, 1995; Bystrom, 1999) and theoretical development (Byström, 1999; Vakkari & Kuokkanen, 1987; Vakkari, 1999), which analysed the relationships of task complexity and information seeking. Ellis's elaboration of the different behaviours involved in information seeking consists of six features. The strength of Ellis's model is that it is based on empirical research and has been tested in subsequent studies, most recently in the context of an engineering company (Ellis & Haugan, 1997).

Ingwersen's (1996) model is made by examined a number of other elements first within each area of his model (Borlund & Ingwersen 1997; 1998; Borlund, 2000) which had developed and tested an evaluative strategy on the basis of this model and had demonstrated its value in testing interactive information retrieval systems.

Any job consists of tasks, which consist of levels of progressively smaller subtasks. Each task also has a recognisable beginning and ending, the former containing recognisable stimuli and guidelines concerning goals and/or measures to be taken (Hackman, 1969). The relationships of objective and perceived tasks have

been considered in organisational psychology (Hackman, 1969; Wood, 1986; Campbell, 1988).

The literature suggests many task characteristics related to complexity: repetition, analyzability, a priori determinability (Campbell, 1988; Daft et al., 1988), the number of alternative paths of task performance, outcome novelty (Fischer, 1979), number of goals and conflicting dependencies among them (Fiske & Maddi, 1961; Hart & Rice, 1991), uncertainties between performance and goals, number of inputs (March & Simon, 1967; MacMullin & Taylor, 1984; Tiarniyu, 1992), cognitive and skill requirements, as well as the time-varying conditions of task performance (Jarvelin, 1986; Tushman, 1978; Van de Ven & Ferry, 1980; Wood, 1986; Zeffane & Gul, 1993), communication (Robson & Robinson, 2015). Also, these characteristics have been understood in many different ways in the literature (Jarvelin & Wilson, 2003).

Seleznyov and Puuronen (2003) conducted study by using continuous user authentication to detect masqueraders. A prototype of a host-based intrusion detection system was built, which detects masqueraders by comparing the current user behaviour with his/ her stored behavioural model. The model itself was represented by a number of patterns that describe sequential and temporal behavioural regularities of the users. This paper also discussed about implementation issues, and provides performance results of the prototype.

Foster (2004) constructed nonlinear model of information-seeking behaviour, which contrasted with earlier stage models of information behaviour and represents a potential cornerstone for a shift toward a perspective for understanding user information behaviour. The model was based on the findings of a study on interdisciplinary information-seeking behaviour. The behavioural patterns were

analogous to an artist's palette, in which activities remain available throughout the course of information-seeking. The paper has shown that four main implications of the model as it applies to existing theory and models, requirements for future research, and the development of information literacy. Central to these implications is the creation of a new nonlinear perspective from which user information-seeking can be interpreted.

Bokhari (2005) carried out a study to understand the nature and strength of the relationship between system usage and user satisfaction in the information seeking (IS) research and to validate this relationship empirically as defined in DeLone and McLean's IS success model. This research found a positive correlation between system usage and user satisfaction, although not very strong but "medium" in its nature, perhaps sufficient to perpetuate the tantalizing search for a relationship between such clear-cut metrics. It provided a direction for future research to find the moderators that might affect this relationship.

Ahmadi, Dileepan & Murgai (2012) carried out a study to examine the advantages of developing a simulation model of a university library, in order to balance the available resources with demand for services. The findings of the study has shown that a simulation model of the arrivals, flow, and usage patterns of library resources by the patrons described in this research, determined that there were four critical resources, which are the number of reference librarians, the number of checkout assistants, the number of computers, and the number of electronic gadgets.

The web acceptance and usage between goal-directed user's studies were conducted among experiential users for incorporating intrinsic motives to improve the particular and explanatory technology acceptance model value (Spink, Jansen & Ozmultu, 2000; Seleznyov & Puuronen, 2003; Sanchez-Franco and Roldan, 2005).

Current human information behavior models do not take the matter of human multiple information task interaction phenomena (e.g. Bates, 1989; Dervin, 1983; Ellis et al., 1993; Kuhlthau, 1993; Vakkari, 2001). Such models are limited to explaining the process of information access and use while carrying out a single task (Spink and Park, 2005; Park, 2015). In 2007, Joint carried out a study to point out those past models of information ownership may not carry over to the age of digital information (Joint, 2007). Thus, aim to propose a model were started, which serves to illustrate that a number of factors which were responsible for, and contribute to, the different forms of sustainability of digital information services (Hemmig, 2008; Hofman-Apitius, Younesi & Kasam, 2009; Chowdhury, 2013; Koo, Chung & Kim, 2015). These models will be further discussed at length in later at Chapter-4.

### ***2.2.3. Review of Literature Related to Library/ Internet Usage Pattern***

While studying on computer system for searching of full text multiple databases Jacobson and Fusani (1992) have found that user's information needs has an influential factor in the process of their information seeking. The need for skill mediation and intervention and digital library as dynamic systems have been revealed by Jacobson and Ignacio (1997) while studying the influence of electronic information system on teaching methods and its curricula.

Dagleish and Hall (2000) conducted a study to identify the ways in which the World Wide Web can be used as part of the students learning process. The findings of the study has shown that the key factor which influenced the students to use the web as an information resource was "time" factor, in the sense of obtaining information quickly and easily, not experiencing difficulties in locating the required information, and avoiding inherent delays in the computer systems. Further, Debowski (2000)

examined the service provided to the users for increasing the usage of information technology in providing library services. This paper highlighted the need to maintain a clear understanding of users and their difficulties in accessing electronic information services. Electronic information service needed to focus more effectively on training users in information search, increasing the types of electronic support to users, and raising the profile of the information services to maintain its market share. Eason, Richardson & Yu (2000) conducted a study on usage pattern of electronic journals. The results of the paper have shown that many printed journal were likely to be replicated when other electronic journal services are launched. Liew, Foo & Chennupati (2000) examined a study on graduate student end-users' use and perception of electronic journals. This paper discussed about the e-journals in the light of the use and perception of graduate student end-users, and their expectations of future e-journals. The results of the paper have shown that user study presenting significant implications for the design of future e-journals are reported. The results also have shown a significantly high acceptance of e-journals by this category of users. Spink, Jansen & Ozmultu (2000) examined a study to see the use of query reformulation and relevance feedback by Excite users. The findings of the study have shown that the analysis of a large data set of user queries use relevance feedback. Further, it has also shown that the limited use of query reformulation and relevance feedback by Excite users; only one in five users reformulated queries and most relevance feedback sessions were successful.

Zhang, Lee & You (2001) investigated the usage patterns of an electronic theses and dissertations system in the Korea Institute of Science and Technology Information (KISTI) Electronic Theses and Dissertations in South Korea. The results of the study indicate that the KISTI ETD system usage had seen a significant increase

since its second year. It was also found that there are a very large number of one-time visitors to the KISTI ETD system. Franklin & Plum (2002) conducted a study on Internet based electronic services usage patterns at four academic health sciences at four geographically disparate academic health science libraries in the USA between 1999 and 2002. The principal fields of inquiry included demographic differences between in-house library users as compared to remote library users by status of user; users' purposes for accessing electronic services. The results of the study construct a guide which service decisions in academic health sciences libraries. Peters (2002) carried out a study on the value of e-resource usage statistics which contain a wealth of information. The article also concluded with some speculation about the overall value and long-term potential for e-resource usage statistics. Online information environments such as digital libraries became self-improving and modify their organization and presented in order to better way for data collection about human behaviour.

Sinha, (2004) carried out a survey to examine the scenario of automation and networking of library and information centres (LICs) of North Eastern region of India. In the study, he had found that automation and networking scenario of North Eastern region of India was not up to date mark and there was many initiatives should be taken to develop the situation. Sanchez-Franco and Roldan (2005) analyzed the web acceptance and usage between goal-directed users and experiential users, incorporating intrinsic motives to improve the particular and explanatory TAM (technology acceptance model) value, which is traditionally related to extrinsic motives. As per the reports of the study; experiential and goal-directed users did not weigh extrinsic and intrinsic motives in the same way when on the web. Goal-directed

users were more driven by instrumental factors and focused on their decision-making process while experiential users were more motivated by process.

Gardiner, McMenemy and Chowdhury (2006) carried out a study of information use patterns of academics in British universities in three disciplines computer and information sciences, business/management, and English literature. The findings of the study has revealed that english academics made higher use of printed information resources, such as text and reference books, than academics of any other discipline included in the study; they tended to be the least frequent users of electronic resources such as full-text databases, indexing and abstracting databases, search engines, and internet sites. Computer and information sciences academics tended to make greatest use of electronic-based information resources, and the least use of print-based information resources, and business/management academics fell somewhere in between these two disciplines. Gauger and Kacena (2006) conducted a study to explore what effects institutional size and the selections of JSTOR collections have on the overall usage statistics. The article provides some insights into how JSTOR data can be used to demonstrate the match of resources to curriculum as well as areas where library outreach and instruction might encourage appropriate use.

Zainab, Huzaimah and Ang (2007) examined the users preference and use of electronic journals in general, especially those published in a hosting system, Electronic Journal of the University of Malaya (EJUM), Malaya. The finding of this study have shown that the electronic journals are used for searching new information, reading full-text articles, reading abstracts, and browsing the table of contents. The majority of respondents also preferred articles in pdf form. Further, the majority of respondents read the abstracts first to determine relevance before downloading the articles. Johnson (2008) examined cognitive differences between frequent and

infrequent Internet users. The findings of the paper has shown that the significant group differences in visual reasoning consistently favored frequent Internet with respect to visiting chat rooms and downloading music. However, infrequent users demonstrated better verbal reasoning than frequent users. The findings of the paper also supported the conclusion that extensive and appropriate use of the Internet is associated with increased human capacity to reason.

Pors (2008) conducted a study on the traditional use patterns of high school students. The findings of the study indicated that traditional demographic factors alone cannot explain all of the variability in the students' information behaviour. It is also indicated that a correlation exists between the amount of use of libraries and digital resources.

Gupta (2011) conducted a study on use pattern of print and electronic journals at the Kurukshetra University, India. The result of this study has shown that use of print periodicals and frequency of daily use of print periodicals is more among teachers than research scholars. Both teachers and research scholars faced very difficult in accessing print journals. Awareness of e-journals is more in Physics teachers than Chemistry teachers. Teachers used INFONET more than research scholars on daily and weekly basis. The print journals are still attracting users, especially to the faculty members. Kim (2011) analyzed the relationship between text recommender system using user's usage patterns to develop a novel and flexible recommender system based on usage patterns. The results of the study revealed that a novel recommender system based on usage patterns and keyword preferences. Unlike conventional approaches of collaborative filtering and content-based filtering, the proposed approach analyzes the data captured from the navigational and behavioral patterns of users. The study also has shown that a set of keywords can be regarded as

the representative of contents, and therefore metadata dose not needed to be generated by human indexers or image analysis techniques. Singh and Joshi (2011) also conducted a study on the students of Kurukshetra University on their internet preferences. This study has indicated the variations in the preferences of male and female students. It also reflects how female students prefers search through search engine while male students used www and search engine. Suseela (2011) conducted a study on application of usage statistics for assessing the use of e-journals in University of Hyderabad, India. The paper highlighted the application of usage reports by the university library in decision making during renewals/subscriptions, i.e. the selection of databases, upgrading the versions, increasing licences, cancellation of subscriptions, etc.

Kumar (2012) carried out a study to investigate the influence of user demographic characteristics on the impact of usage of search engines, particularly Google, with special regard to OPAC in the context of an Indian university setting. The findings of the study revealed that users' demographic characteristics had the impact on the web searching in only some limited activities or over a few issues. It also could be concluded that instead of user characteristics, searching pattern of the web is a major factor affecting information-searching patterns of OPAC in a university setting. Sinha, (2012) carried out a study on Internet literacy skills and Internet usage patterns to access e-resources by Assam university library users. The study has shown that the library users were not fully satisfied with the library services.

Bankole (2013) evaluated the use of internet services and resources by scientists at Olabisi Onabanjo University, Ago Iwoye, Nigeria. The finding has shown that use of internet use was widespread to all scientists as majority of them were using

it every day. The majority of respondents accessed the Internet from a commercial cyber cafe' followed by homes. Email was the most popular internet service, while Google, followed by Yahoo and Scholar Google, were the most used search engines. The majority of the scientists preferred for getting information from the internet, while less than one-third still prefer the traditional library.

Bhattacharjee, (2014) conducted a study on e-resource and Internet use pattern of social science community of Tripura University, Tripura. In the study, it was found that social scientists generally facing problem while accessing e-resources. Hwang [et. al.] (2014) carried out a study to investigate and analyze the usage patterns of electronic book users and their perceptions of e-books from various perspectives of academic libraries in South Korea. This study has shown that most e-book users at the university libraries in Korea aware about e-books through the Web sites of university libraries. It was also found that users with higher levels of education are well aware of e-book services at libraries and often use the services. Most users learnt about e-books through the library Web sites or its catalogs and that corresponded to the current routes to utilize e-books.

Arshad and Ameen (2015) examined the usage patterns of a university library website to find out user's behaviour of monthly use. The findings of this study have revealed that the university library website was heavily used by users. Free scholarly journals, resources downloaded, e-journals, e-books and donated personal collections were among the top most used resources and services. Renaud [et. al.] (2015) conducted a study on mining library and university data to understand library use patterns. The results of the study have shown that it was difficult to determine the correlation between library use and student achievement. A major outcome of the

effort was that the collection and secure analysis of research data completed in a much more efficient manner than if the partnership has been made.

#### ***2.2.4 Review of Literature Related to Information Retrieval Pattern.***

Traditionally, information professionals and retrieval systems were conceived as guardians and facilitators of knowledge. Karamuftuoglu (1999) stated a study to show the increasing relevance of the knowledge production capability of information storage and retrieval systems in the context of perpetual innovation. The knowledge production potential of information retrieval systems was recognised in the information science community. In a perpetual innovation economy, knowledge or information embedded in commodities, not the physical material from which commodities were made, which becomes the main source of profit. However, the peculiar character of information/ knowledge meant that privately owned knowledge tends to flow back into the public domain. Conversely, knowledge underlying production processed and produced goods were drawn, to a large extent, from social stock of knowledge. The knowledge production potential of information storage and retrieval systems and tools became more widely acknowledged and accepted among information practitioners.

Borlund (2000) carried out a study to set the basic components, which constitutes the experimental setting intended for the evaluation of interactive information retrieval (IIR) systems. The results indicated that tailoring work task group was important in motivating the different versions of semantic openness to the tested persons for search treatment. Jeribi, Rumpler and Pinon (2000) stated the personalized information retrieval in specialised virtual libraries. The study aimed to design an intelligent tutoring system capable of performing personalised information

retrieval, depending on users' interests. The proposed system was specially designed for people who had a sight deficiency. Those specific persons used slow devices to access scientific textual information, so they had a critical need for systems able to retrieve relevant information quickly. Warner (2000) conducted a study to the value of discriminatory power in discussions of indexing. The study also has shown that it builds more satisfying evaluative criteria while preserving a strong continuity with previous work, particularly in recognize the utility of developed information retrieval techniques.

Walczak (2002) conducted a study on Information security for agent-based WWW medical information retrieval. The study leads to the conclusion that a protocol for identification of trustworthy agents must be established and the process of exchanging information should not increase the security risk of a patient privacy compromise. Koshman (2004) conducted a study to compare usability between a visualization and text-based system for information retrieval. Overall results of the study has shown that there were no significant differences among novices and online searching experts in the system familiarity times nor in their task performance times for the five tasks measured in the study. The findings of the study also suggested that visual information browsing environment was a learnable system and its components had pragmatic application to the development of visualized information retrieval systems.

Further, the concept of human information behaviour and to explore the relationship between information behaviour of users and the existing approaches dominating design was studied for evaluation of information retrieval (IR) systems (Keshavarz, 2008). Enakrire and Baro (2008) stated the patterns of information storage and retrieval in University Libraries in Nigeria. The findings of the research

supported that storage and retrieval devices such as computers, hard disks, televisions, audio-tapes, video-tapes, CD-ROM, video-players, video-disks, abstracts, bibliographies, bulletin boards, indexes, Internet, intranet, Xerox, DBMS, microforms, etc. are used in the university libraries of Nigeria to disseminate information to the patrons at the right time and from the right source. The study also revealed that modern technology has had a great impact on the storage and retrieval of information. It was observed that finance is needed for the purchase of storage and retrieval facilities in order to tackle the issue of information dissemination.

Mu, Lu and Ryu (2010) evaluated the merits of information retrieval system; to investigate users' search strategies when they used the new search system. The results of the study have shown that MeshMed provide more choices to a user for selection of searching component. Naderi and Rumpler (2010) conducted a study to discuss and test the claim that utilization of the personalization techniques can be valuable to improve the efficiency of collaborative information retrieval systems. The paper proposed several formulas as well as two techniques to evaluate them. The results have shown that among the proposed formulas in the paper, the query-document graph based formula is the most effective. After integrating that formula into PERCIRS and comparing it with nine other IR systems, the results of the system were found to be better than the other IR systems. Peters and Stock (2010) described about the cut off tags in the long tail of a document specific tag distribution. The finding of the study has shown that the search tags were compatible with broad and narrow folksonomies and with all knowledge organization systems, while index tags were only applicable in broad folksonomies.

Jackson and Smith (2011) conducted study to examine the role of tagging, on discovering relevant information when compared to traditional hierarchical filing

systems. The study has shown that users use a wide variety of different filing methods to store their files, with every participant providing a different answer. The results of the study has shown that new method for filing information system would help the users to find files about what they were looking for without the use of a search engine. Ma, Wei and Chen (2011) carried out a study to propose a framework for describing and evaluating the representativeness of a small set of search results extracted from the original results. Theoretical analysis has shown that the proposed coverage measure and redundancy measure, as well as the combined measure can effectively evaluate the quality of extracted set referred to a given original set of search results. Empirical experiments with the benchmark data were conducted in the paper to compare three IR strategies, namely Clustering and Random, verifying the effectiveness of the proposed measures, which are also consistent with theoretical analysis.

Yi (2012) carried out a study on medical resources searching using an ontology-driven medical information retrieval system. The paper was designed and implements an ontology-driven medical information retrieval system by building a medical ontology based on the Centers for Disease Control and Prevention's medical records. The results of the study has shown that recall and search time improve when using an ontology-driven information retrieval system, rather than a traditional, hyperlink-based information retrieval system. Fralinger and Bull (2013) examined to identify factors that might affect the international usage of US Institutional Repositories as part of assessment to determine an institutional repositories return-on-investment. Many IR administrators might be unaware of or apathetic to methods of measuring the usage, which is based on the results gathered by the study. While there was no statistically significant correlation between international usage and variables

such as funding status, degree-level of the institution, number of students, or software type, the largest group of institutional repository administrators, across all variables, were “unsure” of their institutional repository international usage.

Yuan and Belkin (2014) carried out a study to describe a dialogue structure that was implemented in an experimental information retrieval system, in order to address the concern. The results demonstrated that the dialogue structures indeed support effective human information behavior patterns in a variety of ways. The results have shown that the future interactive information retrieval system design, specifically, the different information seeking strategies that searchers can engage in, and designed dialogue structures appropriate to their support.

Moreover, a numbers of studies were carried out to investigate information seeking pattern and retrieving process. These studies identified the nature, stages, types, and pattern of search that affect retrieving processes (Peters & Stock, 2010; Jackson & Smith, 2011; Yuan & Belkin, 2014, Bhattacharjee, Pathak & Sinha, 2015).

### ***2.2.5 Review of Literature Related to Information/ Knowledge Society***

The term “information society” is very widely used in the field of information studies and beyond, and this concept has been explored from a variety of theoretical standpoints (Castells, 2000; Golding, 2000; Martin, 1995; Robins and Webster, 1999; Webster, 2002). The library and information literature in this area often focuses on the changing role of the library and information service (LIS) worker in the context of the information society and on information policy in the UK (e.g., Dearnley and Feather, 2001; Feather, 2004, Spacey et al., 2004). There is wide debate about the validity, applicability and contexts of the information society, and the concept is made use of

in a wide range of more popular literature (Gates, 1995; Negroponete, 1995) as well as academic debate. Many of the aspects of current information literacy practices originated from a print based culture, which further mixed with the hybrid nature of printed and digital environments. These radically changing environments are lead to develop the information literacy paradigm. Many studies were carried out to know central concept of digital and hybrid information literacy (Ershova, 1998; Bawden, 2001; Kurbanoglu, 2003; Mutula, 2004; Spiranec & Zorica, 2010). According to ALA (1989) information-literate had been defined as “having the ability to recognize when information is needed, then to be able to locate and evaluate the appropriate information and use it effectively”.

Information literacy is thus very essential for living in the 21st century, and is equally relevance in any society through all over the world. Various studies were conducted throughout the world to identify the concept, issues related to the information literacy (Hoare, 1998; Hernandez & Urena, 2003; Sinikara & Jarvelainen, 2003; Idiodi, 2005).

Singh (2005) conducted a study to establish the role that ICT for Indian society which helped India to emerge as an information society which has shown the impact of ICT towards the information society on gender basis which indicate that majority individuals were worried about technological change. Simillarly, Duff (2002) and Jorna, (2002); in their studies found that there was an increasing demand to introduce information literacy studies in academic curriculum.

Various literatures were published during the starting year of 21<sup>st</sup> century related to information literacy. Hirose & Sonehara (2008) carried out a study on information literacy and the results have shown that for managing information credibility risk in ICT era and demand for the time, which played major role as both

positive and negative effects on contemporary society. Thus, there is a need to set up information literacy skill for all of us in the modern information society.

Sinha, (2009) conducted a study on ICT and Internet awareness amongst the research scholars and university teachers. The results of the study have shown the less awareness of library services among faculty than research scholar.

Sinha, Bhattacharjee, & Bhattacharjee (2013) conducted a study on ICT and Internet literacy skills for accessing to e-resources available under N-LIST programme on college library users of Barak Valley, South Assam. The study has shown that majority users were not aware of NLIST facility provided by library.

Detmering et al. (2015) carried out a study on information society which has shown that the roles of library and information professionals had to change from intermediaries to facilitators and trainers.

It is said that knowledge management is just other name of librarianship (Koenig, 1996; Miao, 2001). Many knowledge management literatures had focused specifically on conceptual models that try to capture the elements of a knowledge society and offer guidelines for its management (Wiig, 2007; Sharma et al., 2008; Dang & Umemoto, 2009; Kapyla, 2012).

### ***2.2.6 Review of Literature Related to Scientific Community***

Scientific or scholarly communication in academic settings is a system with the exchange and sharing of information as its main function (ALA, 2006; Xia, 2006; Khosrowjerdi & Alidousti, 2010).

According to Hanson (1973) scholarly communication play an integral role to the day-to-day academic activities. This is evident in the fact that almost every scientific article refers to other parts of the literature. Further, Riyahi (1995) discussed

the scientific article or communication and it was found that those articles play a major role in science and technology, by contributing to the expansion of knowledge and acceleration of the process of science application; without which development of science could never be accomplished.

In 2005, Doldi & Bratengeyer, had conducted various reviews related to the several studies of evaluating the web with comparisons of databases such as medicine (Williams et al., 2003), environmental science (Murphy, 2003), mathematics (De Carlo, 2003), toxicology (Wright, 2001), chemistry (Voigt and Welzl, 2002) and agriculture (Zhang and Lane, 2001). Other researchers have paid attention to other aspects of scientific communication and conducted various studies such as studies related to: social and economic factors (Wilson, 1995), communication in science and technology (Fjallbrant, 2006), ICT, digital libraries (Borgman, 2000; Roosendaal, 2003), changes and evolutions (Case, 2002), collaboration paradox (Duque et al., 2005), infrastructures (Lynch, 2003), electronic journals (Rao, 2001), institutional repositories (Johnson, 2002; Lynch, 2003), philosophical aspects (Dascal, 2003), electronic digests (Ng, 1998), informal aspects of scholarly communication (Rowlands et al., 2004), and scholarly communication in east and southeast Asia (Xia, 2006), development and context of scientific and technical communication (Vickery, 1999).

### ***2.2.7 Review of Literature Related to Others Topics***

Spink, Jansen & Ozmultu (2000) carrier out a study to explore the usages of social networking sites by different university library users indicated that the users demonstrated distinct patterns of social networking site usage. Angus, Thelwall and Stuart (2008) investigated the general patterns of tag usage within university groups to

the wider Flickr community which had well known online image management application. The results have shown that over half of all the tags seem to be useful for the user community of the system as a whole. Overall it was found that two particular genres of images tended to dominate the university groups and these were: photographs of an architectural nature.

Park (2010) conducted a study to explore the usages of social networking sites by different university users with the implications of it for academic library services. The analyses of the results indicated that the three groups of users demonstrated distinct patterns of social networking site use. Although undergraduates used the profile service more than the community service, graduates used the community more than the profile service. Most faculty members were not active users. Six factors that affected these different usage patterns were identified: desire for expression, peer influences, familiarity with information technologies and sensitivity to privacy, nature of using the internet, and perception of the social networking site.

Chen and Ke (2013) investigated the behaviour and patterns preferences information of CiteULike by taggers in social tags. The study recommended two usage such as categories and implicit patterns. The finding of the study also has shown that the frequency of tag categories was consistent with that of individual tags and obeyed a power law distribution.

Boateng and Liu (2014) conducted a study to explore Web 2.0 technologies usage through the academic library websites. The results of that study indicated an overwhelming implementation and usage of Web 2.0 applications in the top 100 US academic libraries. All academic libraries examined that those had a social media presence on Facebook and Twitter, making SNS the most widely applied Web 2.0 tool. Wadell, Bjork and Magnusson (2014) investigated how employees used their

social networks to acquire user information and how that information was used in the development of new products. The results have shown that many employees lack social networks through which they can acquire information about the users' needs.

To explore Web 2.0 technologies usage and trend in social media presence in the academic library websites various studies were carried out and the results has shown tha trends towards using web 2.0 resources in various patterns by the user's community (Spiranec & Zorica, 2010; Boateng & Liu, 2014; Fay & Nyhan, 2015).

Osborne & Cox (2015), in their study on usage pattern of social networking site suggested that the current generation of library customers favour the Internet as search tools, predominantly Google, over library catalogues.

To explore library facilities, interlibrary loan is an effective way to provide document to the users, especially to those libraries which are remotely located (Dobson & Pedersen, 1998; Goodier & Dean, 2004; Leykam, 2008). Studies were carried out for document delivery practices between academic libraries of UK (Morris & Blagg, 1998; Prowse, 2000; Kidd, 2003), at developing countries (Dobson & Pedersen, 1998 A; 1998 B), agricultural sector of China (Zhang, 1999), changing patterns in interlibrary loan (Goodier & Dean, 2004), INFLIBNET's approach for document delivery at India (Salgar & Murthy, 2003), remote document supply in Iceland (Hlynsdottir & Gylfadottir, 2004), impact of consortia purchasing on the document supply service (Jose & Pacios, 2005).

### ***2.3 Conclusion***

The above review of literature based on the related studies of information seeking behaviour in different parts of India and along with various countries of the world. Further, reviews were conducted as per the mindset of the proposed theme.

Various aspects along with the main theme have discussed; which helps to identify the gaps in the related study. The above review of literatures also indicate the various study related to use, access, use pattern, information needs, information seeking process, information seeking behavior, university/ college library users, existing system, behavior model and other various types of studies in India as well as outside India. In these studies, scientists are found to be one of important group; many studies have been conducted so far to find out their information needs and information seeking behavior. But, from the review of literatures, it was also found that till information seeking behavior of scientific communities particularly in Assam, India remain untouched in major aspects of postmodern era of ICT environment.