1.1 Introduction

Information is vital for research. Information is the main ingredient for research, since the product of earlier research forms the basis for future research. The available information forms the raw material for further research. It therefore demands that the generated information, i.e. the results of the research be communicated, since generated information itself has no meaning, unless it is properly communicated and used.

Information is thus very essential to keep research going on, to benefit from the resources being carried on elsewhere and to probe the fields so far unprobed. Thus, the development of science or any academic field, is dependent on free flow of information amongst the researchers, since research in cumulative in nature.

Communication of information involves the process of transfer of information from the sources to different user modes. But the flow of information is not as smooth as it appears. A number of impediments come in the way of successful communication of scientific information. For example

- Exponential growth of Scientific Literature
- Escalating cost of Scientific Literature

Increasing research worldwide is resulting in exponential growth of scientific literature, resulting in the coining of the term “Information Explosion”. With the increase in the literature, the time at the expense of the users, to read the ever-increasing and fast increasing literature is the same. The limited time and increasing literature poses a serious problem.

Added to the growing literature, the cost of the literature is escalating. This increasing cost inhibits the individual’s capacity to subscribe to the journals or books and thereby inhibits an individual’s access to relevant literature.
Increasing research points out to increasing number of professionals requiring information. Research being conducted worldwide in different areas, the demand now is for a wider geographical coverage and a wider cross-discipline and cross specialty coverage. Increased demand for information call for increase in supply of information. Another important factor in research is not mere access to relevant information but access at the right time.

The net result of increasing information, increasing cost of information is that no individual has either the time or the resources to access all the information required for the research work. It is at this juncture, that the libraries and information centers come to the aid of the researchers with resources providing access to World-Wide scientific literature.

1.1.1 Libraries and Technology

Libraries are backbones to all the activities carried out in the field of education, research, training, etc. Libraries assist users in developing proper background and base for the development of information society. Traditional Libraries were providing sources based on the print media and the developments were based on the manual power. The main weakness of traditional Libraries was Information sources available only in print. Maintenance of the physical library was also a very challenging task.

Due to the impact of industrial and technical revolution, importance of education was realized. With the importance of education, the importance of information was also realized. Increasing education resulted in spurt in research activity. In order to meet the information needs of resources, Special Libraries sprung up in all major Research Institutes. Due to the increase of scientific information, because of increasing research, Scientific Journals, Technical reports, Conference proceedings, Patents, Standards and Theses etc started appearing in big numbers. Libraries started serving the role of information gatherers and
information communication agents through time and enabling the user to access all available knowledge at one place.

But as time passed, quantum of information available to mankind grew. The task of the Libraries became more and more difficult. The number of Books, Journals and other kind of resources which could be maintained by Libraries was limited due to space and financial constraints. As the number of Books and Journals increased, the problem of space started becoming acute. Increase in number of resources also made the task of the user of the Library difficult. It became more and more difficult to search for specific pieces of information. At this stage, technology came to the rescue of Libraries, by making information storage and access easier and less expensive. Technology provided the Library with newer and more efficient way of storing and retrieving information.

The major change in the way library stores and maintains knowledge came with the advent of computers. Initially computers were used by Libraries for maintaining indexes about books in the place of card indexes. This enabled a more efficient search for books and journals. Computers also helped in the, maintenance of records about issues and returns of Books and Journals lent out to the users. In most Libraries the computers were used only by the Library staff, whereas in some others, the users of the Libraries were allowed to search for the books using the computers. During 1950s Libraries started using microfilms and later in 1979s computerized databases were developed to offer more information and better ways to search and retrieve (wikibooks, n.d.). Information Technology application and techniques are being used by Libraries for information processing, storage, communication and dissemination of information. Further, origin of Internet and the development of World Wide Web (WWW) have opened up new vista for communication of scholarly information and helping Libraries to create and maintain Libraries’ Websites, Blogs, institution Digital Repositories to provide faster, easier and wider services to its users. Another important
impact of this technology is remote access facility to information sources i.e. Online full text Databases, E-journals, E-books, Library Catalogue (OPAC) and Online Theses and Dissertations (OTD) etc.

The twentieth century was shaped by sweeping changes in Information and Communication Technology (ICT). The use of ICT in Libraries has resulted in a great metamorphosis both in their collection development and in their service structure. Thus, Libraries are using technology to strengthen their collection and to provide speedy access to geographical dispersed scholarly information.

With the advancement of new Technology, the Library Profession is constantly changing and traditional library system is now taking shelter of ICT application to support online and up to date services. It is possible for the Libraries to use the information resources available over the internet in digital form. Users are benefitted due to this new source of information collection and are relying on internet based information for their day to day tasks. Books and Journals are already available in electronic form along with other resources on the net. Due to this change, Libraries are also shifting their collections, services, facilities and practices based on e-resources. Information Technology changed the scenario and eliminated the weaknesses of traditional Libraries to the maximum level.

1.1.2 Role of R&D Institutions in the Creation and Dissemination of Information

Research Institutes are a National Laboratory or a Research Institute or a private and public sector, in house Research and Development (R&D) unit or a non-profit scientific and Industrial research organization. They are of varied size in terms of infrastructure, facilities and research inputs etc. The aim of these institutes is to discover solution to the problems or creating new knowledge or to make improvement in existing knowledge through research towards societal development, nation building and well-being of people (Basavaraj, 2015).
Research Libraries as a center place of research institutes, also leveraging the new technology to provide new and timely services to its users.

Research Libraries are those Libraries that are mainly found in Research Institutes. The main aim to establish these Libraries is to support learning and research processes. Traditionally, scientists and research scholars use journals for much of their research and professional development and to stay current with progress and trends in their field. They rely heavily on scholarly Journals. The advent of ICT has enabled them to create, grasp and share the information generated worldwide in electronic formats, without delaying in accessing information. The new information environment, characterized by Cloud Computing, Web based information resources, Internet facilitating information, creation of information, dissemination, retrieval and management of information with hyperlinks and 24/7 availability of web services to Libraries, provide personal and on the spot services to users at any time.

1.2 Electronic Information Resources (EIRs)

The early Libraries were defined as an Institution that managed and preserved the intellectual resources of Society and made them available in systematic manner to the users. But evolution and growth of Internet and e-publishing Industry in the field of ICT has given birth to EIRs. This has played an important role by providing a convenient medium and fast access to a vast range of information.

1.2.1 Definition of Electronic Information Resources

An "e-resource" is define as any work encoded and made available for access through the use of a Computer. It includes electronic data available by (1) remote access and (2) direct access (fixed media). In other words: Remote access (e-resources) refers to the use of e-resources via computer networks. Direct Access refers to the use of e-resources via carriers (e.g., discs/disks, cassettes, cartridges) designed to be inserted into a computerized device or its auxiliary equipment (AACR-2, 2002). E-resources are resources in which information is
stored electronically and which are accessible through electronic systems and networks. According to IFLA/ISBD (ER) (2011) 1: An e-resource consists of materials that are computer-controlled, including materials that require the use of a peripheral (e.g. a CD-ROM player) attached to a computer. E-resources are of two types: data information in the form of numbers, letters, graphics, images and sound, or a combination thereof and programs (instructions or routines for performing certain tasks including the processing of data and programs); they may also be a combination to include electronic data and programs (e.g. Online services, interactive multimedia) (www.ifla.org). According to Reitz, (2005) E-resources are materials consisting of data and or computer programs encoding for reading and manipulation by a computer by the use of peripheral device directly connected to the computer or remotely via a network such as a internet. The category includes Software application, Electronic text, Bibliographic Databases etc.

With the advancement and development of ICT, a variety of information resources are appearing besides print media. The beginnings of EIRs can be traced back to 1960s with the development of Machine Readable Cataloging (MARC) format in the 1960. Bibliographic Database became available at approximately the same time. During the Microcomputer Revolution of the 1980s, Libraries acquired Software and data on Diskettes and offered Database on CD-ROM. Further, with the advent of WWW created in 1990, EIRs were widely available on Web. Libraries offered Web based Catalogue, Full-text Database, e-journals, e-books through Web (Hawthorne, 2008).

EIRs facilitate the dissemination and archiving of information using digital media. These resources are able to meet the users’ increasing demands and expectations for quicker and easier access to information. E-resources include E-journals, E-books, Databases, Blogs, Internet, OPAC, E-patents, E-standards, Dictionaries, OTD etc. Although electronic dissemination of information has existed for some time, the advent of
the Commercial Internet has facilitated the diffusion of electronic resources as mechanism of disseminating information.

EIRs have many advantages over the print resources such as easier access, wider information, multi-access, remote access, speedy retrieval, multiple search facilities, easy to store, transfer and carry, links to the references and compatibility of various format like images, video, audio etc. EIRs provide access to information, which could have been denied to users because of geographical location or finances. EIRs provide access to current information as they are updated frequently. A user can have and gain access to and additional and related information by extensive links provided through various search techniques; an abundance of information from any location of his/ her convenience.

The benefits of EIRs mentioned above, are capable of helping the user to overcome the problems of increase of quantum of information, increase in the number of sources of information, literature scatter etc. By means of technology, it is possible that access to information anytime and anywhere is possible. Apart from these, technology offers users the opportunity to consult more information sources than before. The user can save considerable time on visit to the library to browse through books and journals. The ability to transfer data rapidly to multiple locations, in multiple formats has provided an unprecedented opportunity for transmission of information. Thus, new purchases and subscription of journals, magazines and other resources are heavily weighted toward electronic format.

Research Libraries also have positioned themselves in the twenty-first century with electronic resources where users can remotely access these resources via network. Since, emerging technology is a dynamic force, teaching and learning must also be dynamic to meet diverse users needs including anytime, anywhere access (Johnson, Adams & Cummins, 2012). Scientists working in these institutes are in need for information in very
short period and in the most convenient form, because of their busy schedule, since they are involved in research and related activities right from the initial stage to the final result. Hence, it is pertinent to know the different types of EIRs, their usage and the benefits of the same to the users.

1.3 Users and Technologies

Any resources or service introduced in a library are meant to serve the user of the library. The success of any change in the library has to be measured in terms of how much this change has benefited the user and also how much the user is using these newly introduced resources and how much the user is satisfied by these changes.

Information seekers, who come to the library, will have certain expectations, when they enter the information center. These expectations would include availability of the information they seek, easy access to the required information, exhaustive information whenever they require and information availability within a reasonable period of time i.e. information availability at a fast rate.

In the background of a match between the expectations of the user and the facilities provided by the library, the user assesses the benefits derived from the EIRs. This assessment results in the formation of attitude. The attitude leads to satisfaction towards the EIRs. Accordingly, the acceptance or resistance towards any resource is dependent on the degree of satisfaction the user derives from the newly introduced resources. Satisfaction is derived, when a user finds that the resources fit the framework of his/her expectations and meets his/her requirements and also is within his/her capability to use the technology / resources.

It is necessary that research be carried out to ascertain the usage of these new technologies and also the attitude of the users to these resources. This research would provide a clear picture about the users’ needs, attitudes, satisfaction and opinion to the
new technology based information resources. This would also help assess the efficiency and effectiveness of the new technologies and how responsive it is to the needs of the users.

The result arrived at would assist in enhancing the usage of the resources and also to identify the need for orientation or training the users in order to familiarize them to the new technologies provided. This would ensure maximum usage of the information resources provided.

It is therefore, very essential to analyze the usage pattern of the new resources / technologies by the users of the library, and to know their reaction to the EIRs. It is the user who ultimately decides the success or otherwise of EIRs, by accepting or resisting it. There are strong psychological reasons for accepting or resisting change and these psychological factors will result in formation of attitudes and satisfaction to EIRs.

1.4: Attitude:

An attitude can be defined as a psychological tendency to view a particular object or behavior with a degree of favor and disfavor. Attitudes are believed to directly influence the behavior. Attitude is formed when people judge an object, considering various features of the object, including the evaluation of the object. (Ramachandran, 1994). In practice, the term attitude is often used as an umbrella expression covering such concepts as preferences, feeling, emotions, beliefs, expectations, judgments, opinions, and intentions (Bagozzi, 1994).

Allport (1935) expresses that an attitude is a mental or neural state of readiness, organized thoughts, experiences, exerting a directive or dynamic influences on the individual’s response to all objects and situations to which it is related. Therefore, the way a person reacts to his surrounding is called attitude.

According to Schneider (1985) attitudes are evaluative reactions to persons, object and events. This includes beliefs, positive and negative feeling about attitude object.
In brief, the users use the EIRs with some purposes. The different features of the EIRs help the users in the meeting of different purposes. e.g. up-to-date information, easier access to information, faster access and wide range of information etc. Such an experience of the benefits and usefulness of the EIRs and ease of use of EIRs exert a direct and dynamic influence on the individual’s response to the objects to which it is related. This evaluation results in attitude.

Attitude can be positive or negative based on the experience of the individual with the object. When the users feel that the use of an EIR has benefitted or contributed towards the fulfilling of the purpose, it leads to positive attitude towards the EIRs. On the contrary, when the users feel that the EIRs have not been beneficial, then they develop negative attitude towards EIRs. Attitude is a persistent tendency to feel and behave in a particular way toward some object. It is a complex cognitive process. Svensson (2008) characterized it in three ways:

- Firstly, they tend to persist unless something is done to change them.
- Secondly, attitude can fall anywhere along a continuum from very favorable to very unfavorable.
- Thirdly, Attitude is directed towards some object about which a person has feeling and beliefs.

1.4.1: Components of Attitude

There are three components of attitude, as identified by Sumarwan (2004). They are as follows:

1. Cognitive component (knowledge). It is associated with trust (belief), ideas and concepts, such as knowledge about an object, beliefs about the object or evaluative beliefs.
2. Affective component (emotional). This involves one's emotional life such as feeling happy or unhappy about a situation, object, person or concept.
3. Behavioral component (behavioral tendencies, predisposition to action). This is a tendency to behave to an object.

1.5: Satisfaction:

Satisfaction is a measure of how resources and services provided by a library meet users’ expectations. Satisfaction is nothing but a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experiences (Locke, 1976). Thus, a positive attitude leads to satisfaction. In other words, when there is a match between user’s expectations and the resources provided by the library, the user derives satisfaction from the resources. The acceptance or resistance towards any resource is dependent on the degree of satisfaction the user derives from the newly introduced resources. Satisfaction is derived, when a user finds that the resource fits the framework of his/her expectations and meets his/her requirement and also within his/her capability to use the technology based resources. Satisfaction results, in turn, in more usage of the resources. This fact is also supported by Theory of Reasoned Action (TRA) put forth by Fishbein and Ajzen (1975), Theory of Planned Behavior by Ajzen (1991) and Technology Acceptance Model (TAM), introduced by Davis (1986).

1.5.1 Theory of Reasoned Action:

The Theory of Reasoned Action (TRA) was developed by Ajzen and Fishbein (1975,1980) to predict human behavior. Based on the beliefs, attitude, intentions and behavior framework, TRA assumed an individual’s beliefs on the results of performing a particular behavior would affect the individual’s behavior. Since, Fishbein and Ajzen (1975) found that attitude toward the behavior has a stronger impact than attitude towards object, TRA defined attitude as the individual’s positive and negative feeling regarding the particular behavior. This attitude determines the relative strength of the individual’s intention to perform that behavior. The individual is more likely to perform that behavior if this
individual has a higher degree of intention. In addition, TRA proposed that the intention to perform a particular behavior is jointly influenced by the attitude and the subjective norm, where the subjective norm is affected by the normative beliefs regarding that particular behavior. The subjective norm was defined as an individual’s perception of the importance of the behavior that should be performed, which addressed the influences from the individual’s social environment. The construct model for TRA is shown in figure 1.5.1

**Figure 1.5.1: Theory of Reasoned Action**

1.5.2 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is the modification of TRA. TPB predicts an individual’s intention to engage in a behavior at a specific time and place. According to TPB, individual behavior is driven by behavior intentions, where behavior intentions are a function of three determinants: an individual’s attitude toward behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). Theory also says that perceived behavioral control, together with behavioral intention, can be used directly to predict behavioral achievement. The theory of planned behavior suggests that people are much more likely to intend to enact certain behaviors when they feel that they can enact them successfully.

(Figure 1.5.2: The Theory of Planned Behavior)
1.5.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a model that targets on users’ acceptance behavior towards an information system (Davis, 1989). Based on the beliefs, attitudes, intentions and behavior framework, TAM is specially meant to describe computer usage behavior across a broad range of end user computing technologies and user populations (Davis, 1989).

In order to explain and predict user acceptance of specific types of computer based information systems in a work environment, Davis modified the belief-attitude-intention-behavior relationship of TRA and proposed the Technology Acceptance Model (figure 1.5.3). The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably,

**Perceived Usefulness (PU)** is defined as "the degree to which an individual believes that using a particular system would enhance his or her job performance."

**Perceived Ease Of Use (PEOU)** is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort."

(Figure 1.5.3, TAM)
The present study makes an attempt to analyze the awareness, usage of EIRs, the perceived usefulness, perceived ease of use, attitude and satisfaction of the users of research institutes, since usefulness, ease of use, attitude and satisfaction enhance the usage of the EIRs.

1.6 Literature Review

A literature Review is a critical analysis of published sources, or literature, on a particular topic. It is an assessment of the literature and provides a summary, classification, comparison and evaluation. In the present study, existing literature on the topic has been collected and has been presented under following sub headings:

- Awareness of Electronic Information Resources
- Use of Electronic Information Resources
- Attitude of users to Electronic Information Resources
- Satisfaction of users to Electronic Information Resources

Under each heading, in the present chapter, a sample of two studies have been included, a separate chapter i.e. Chapter three deals exclusively on Literature Review.

1.6.1 Awareness of Electronic Information Resources

Renwick (2005) investigated knowledge and use of EIRs by the Medical Sciences Faculty at the University of West Indies. It was found from his study that the faculty had high awareness regarding e-resources that were made available, but low use of specific resources. Many respondents opined that e-resources were important for their work, although many still expressed a need for training. He recommended that there should be greater promotion of the library’s e-resources.

Study conducted by Tyagi (2011) at IIT Roorkee, India provided information on the level of awareness and use of e-journals. The study found that users had knowledge about the availability of e-journals, but many used e-resources as additional ways to use information.
This study found that most users were aware of the availability of online journals through the library, and they could use them for various purposes.

1.6.2 Use of Electronic Information Resources

Robb and Hicks (2010) conducted a study on print vs e-journals. The most important findings of the study were that a maximum number of journals were used widely by the residency programs like Medicine, Radiology, Obstetrics and Gynecology, and Surgery. These journals required print subscription to obtain the online access. The authors concluded that the library professionals would continue to evaluate the decision to provide only electronic access for an important quantity of the journal collection and shall have to market the decision to move to only online access to the library journal.

Dhanavandan (2012) examined that students are leading users of e-resources in terms of respondents. Most of the students were using the e-resources for studying and updating their knowledge. E-journals and e-books were used by around half of the respondents and it was higher than the other types of resources. The result also found that more than 60 percent of the respondents were satisfied with the e-resources available in the library.

1.6.3 Attitude of users towards Electronic Information Resources

The result of Rajagopal (2013) studies on users’ attitudes and approaches towards e-resources and services in the academic library of pondicherry union territory found that clients of government colleges need further improvement in the application of e-resources. The study found that female respondents mostly visited the library for the purpose of accessing e- journals. He suggested that the colleges and universities should try to provide 24 hours’ electronic source access. This will help the researcher students and faculties to access the electronic resources and to get necessary information at their convenient time.

Analysis of Omollo (2013) study established that majority of students and all teachers (100%) had positive attitude towards ICT use in implementing Biology curriculum having in
general, mean scores of 3.6110 and 3.9946 respectively. Among both teachers and students, there were no statistically significant differences across gender towards ICT use in the implementation of Biology curriculum, even though males had slightly more positive attitude toward ICT use than females.

1.6.4 Satisfaction of users towards Electronic Information Resources

Norliya’s (2009) study found that on an average, the library users are only quite satisfied with the services infrastructure/ place/ space, and collection/ information of the library as a whole. Respondents were relatively most satisfied with infrastructure/ place/ space (M= 3.41), followed by collective/ information (M= 3.27), and lastly services to users (M= 3.18) in that order. The results of the comparison of test means using ANOVA indicated that the levels of satisfaction on the library services, infrastructure, and Libraries’ collection/ information among the respondents from the three faculties were statistically significant and all the mean scores were significantly different from one another.

The study of Zainal, (2013) aimed to integrate end user satisfaction criteria with Library Science and Information System Expectation Disconfirmation Theory (EDT). The conclusion from this study indicated that an integrated approach from both fields is needed to provide a more comprehensive perspective to evaluate and measure the Web OPAC end user satisfaction.

1.7: Need for the study

Library is a service-oriented organization. In order to serve the users better, it has to provide every type of electronic resources. Any resource introduced in the library is meant to help the user. It is therefore, necessary to study the use of these resources by the users and to understand the adaptation of the users to the new technologies. This would help evaluate the degree to which these resources are being used effectively by the users, the extent to which they have been helpful and satisfactory. And in case they are not being used optimally, the
reasons for under-use or non-use of these resources. This study would also help to identify the methods by which the use of the new technologies by the users can be maximized.

An in depth analysis of the literature available on this subject reveals that no such study has been conducted on the use of EIRs in Libraries of research institutes of Punjab. Therefore, it was felt necessary that a study of this nature would provide useful information which could help maximize the use of electronic resources in these Libraries.

The result arrived at would help evaluate the degree to which these EIRS are being used effectively by the users. This study would also help to identify the methods by which the use of the new EIRs by the users can be maximized.

1.8 Statement of the problem:

“Electronic Information Resources in the Libraries of Research Institutes of Punjab: A study of their users’ Attitude and Satisfaction”

1.8.1 Definition of Terms:

- **Electronic Information Resource**: An electronic information resource is any work encoded and made available for access through the use of a computer. It includes electronic data available by (1) remote access and (2) direct access (fixed media) (AACR-2, 2002).

- **Research Libraries**: Libraries which are attached to the Research Institutions.

- **Users**: Registered members of the Libraries.

- **Attitude**: Attitude is defined as learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object.

- **Satisfaction**: Satisfaction is a measure of how resources provided by an institution meet or surpasses customer’s expectation. Customer satisfaction is defined as the number of customers or percentage of total customer whose reported experience with a firm, its products or its services exceeds specified satisfaction goals (Farris, 2010).
1.9: Objectives of the study

Usage of EIRs, Formation of Attitude and Satisfaction of users regarding Electronic Information Resources are related to each other, as described earlier. The objectives have been framed accordingly.

- To identify the awareness of electronic information resources provided by the Libraries of Research Institutes in Punjab.
- To identify the use of electronic information resources by Users in the Research Institutes in Punjab.
- To identify the attitudes of the users towards electronic information resources in the Research Institutes in Punjab.
- To identify the satisfaction of the users towards electronic information resources in Research Institutes in Punjab.

1.10: Hypothesis of the study

The null hypothesis of the study is

- There is no significant difference in the awareness of EIRs between Scientific Respondents, Research Scholars and Non-scientific Respondents.
- There is no significant difference in the use of EIRs between Scientific respondents, Research Scholars and Non-Scientific respondents.
- There is no significant difference in the users’ attitude towards EIRs between Scientific respondents, Research Scholars and Non-scientific respondents.
- There is no significant difference in the satisfaction towards EIRs between Scientific respondents, Research Scholars and Non-Scientific respondents.
1.11: Research Design and Methodology

A Research Design will typically explain how data was collected, what instruments were employed, how the instruments were and the means used for analyzing data collected.

Research Design includes the research problems, comprehensive review of literature, scope of the study, development of hypothesis, collection and processing of data and enumerating the inferences and conclusion. Data collection is the most important part of research design as it facilitates collection of both qualitative as well as quantitative data about a research problem. In this study, questionnaire was used as a tool to collect data and response, from users of research institutes. In the second phase of the study, statistical tools i.e. chi square and Z test was used to analyze the collected data.

1.11.1 Research Methodology

Research Methodology refers to General Principles which underlie how the social world is investigated and how it can be demonstrated that the knowledge generated is valid (Amatya, 2011).

The main purpose of this study is to find out the Attitude of Users to Electronic Information Resources in the Libraries of Research Institutes of Punjab. This study adopted the survey approach to gather information on the use of EIRs. Questionnaire was used to collect the information regarding the awareness, purpose, use of electronic resources, frequency of use of electronic resources, attitude, satisfaction regarding electronic resources and problems faced by users while using electronic resources.

1.11.2 Selection of the Institutions

Fifteen Research Institutes were selected for the study.

There are more than twenty five Research Institutes in Punjab. Out of them, ten institutes deal with education, i.e. PG and UG courses. Hence, they were excluded from the study. It was decided to concentrate on the remaining Research Institutes dealing only with
research. Thus, fifteen Research Institutes, recognized by Government of India and Government of Punjab, were selected for this study.

The Research Institutions selected for this study are the following:

**Table 1.11.3: Research Institutes of Punjab**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Institutes</th>
<th>Year of establishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Irrigation and Power Research Institute</td>
<td>1924</td>
</tr>
<tr>
<td>2</td>
<td>Central Potato Research Institute</td>
<td>1957</td>
</tr>
<tr>
<td>3</td>
<td>CSIR: Central Scientific Instruments Organization</td>
<td>1959</td>
</tr>
<tr>
<td>4</td>
<td>Terminal Ballistics Research Laboratory</td>
<td>1961</td>
</tr>
<tr>
<td>5</td>
<td>Central Forensic Science Laboratory</td>
<td>1968</td>
</tr>
<tr>
<td>6</td>
<td>Snow and Avalanche Study</td>
<td>1969</td>
</tr>
<tr>
<td>7</td>
<td>National Institute of Pharmaceutical Education and Research</td>
<td>1981</td>
</tr>
<tr>
<td>8</td>
<td>Central Institute of Hand Tool</td>
<td>1983</td>
</tr>
<tr>
<td>9</td>
<td>Institute of Microbial Technology</td>
<td>1984</td>
</tr>
<tr>
<td>10</td>
<td>National Institute of Secondary Steel Technology</td>
<td>1987</td>
</tr>
<tr>
<td>11</td>
<td>Insect Bio Pesticide Research Centre</td>
<td>1996</td>
</tr>
<tr>
<td>12</td>
<td>Sardar Swaran Singh National Institute of Bio-Energy</td>
<td>2008</td>
</tr>
<tr>
<td>13</td>
<td>National Agri-Food Biotechnology Institute</td>
<td>2009</td>
</tr>
<tr>
<td>14</td>
<td>Center of Innovative and Applied Bio-Processing</td>
<td>2012</td>
</tr>
<tr>
<td>15</td>
<td>Institute of NANO Science and Technology</td>
<td>2013</td>
</tr>
</tbody>
</table>

The profiles of these organizations are given in Appendix at the end of this Thesis.
1.11.4 Population of the Study:

The registered members of the Research Libraries were considered for the study. These members have been grouped into three categories:

i. Scientists: include the Scientists and the Technicians.

ii. Research Scholars.

iii. Non – Scientific: include staff working in Administration, Finance, Marketing, Doctors, etc.

1.11.5 Sample Size:

The sample size was determined on the guidelines of Research Advisor (2006), with a confidence level at 95 percent and margin of error at 5 percent (Table No. 1.10.6). The study focuses on the defined purpose of determining the use, attitude towards and satisfaction towards the E – Resources in the Research Institutes of Punjab (Table No. 1.10.3). Thus, every attempt was made to maximize the respondents for the sample study by selecting users from all the categories. The questionnaires were distributed to the members of the selected Research Institutions and it was ensured that all the respondents attended to all the questions.

Table 1.11.6: Size of the Population

<table>
<thead>
<tr>
<th>Category of users</th>
<th>Total number of users</th>
<th>Sample required</th>
<th>Number of Questionnaires Distributed</th>
<th>Number of filled-in Questionnaires received</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific respondents</td>
<td>1000</td>
<td>278</td>
<td>370</td>
<td>357</td>
<td>96.49</td>
</tr>
<tr>
<td>Research scholars</td>
<td>356</td>
<td>196</td>
<td>230</td>
<td>199</td>
<td>91.30</td>
</tr>
<tr>
<td>Non-scientific respondents</td>
<td>451</td>
<td>196</td>
<td>220</td>
<td>210</td>
<td>90.45</td>
</tr>
<tr>
<td>Total</td>
<td>1807</td>
<td>670</td>
<td>820</td>
<td>766</td>
<td>93.41</td>
</tr>
</tbody>
</table>
The total numbers of users from the 15 Research institutes were 1807. Of which, 1000 were Scientific staff, 356 were Research scholars and 451 were non-scientific staff. According to the sample table, 278 were to be selected from the Scientific staff, 196 from the Research Scholars and 196 from the non-scientific staff. Anticipating non – response, the questionnaires distributed were more than required, i.e. 370 for Scientific staff, 230 for Research Scholars and 220 for non-scientific staff. Number of filled in questionnaires received were scientific respondents (357), research scholars (199) an non-scientific respondents (210), with a response rate of 96.49, 91.3 and 90.45 percent respectively.

1.11.7 Selection of the Respondents:

Respondents were selected on the basis of Random sample from each of these institutes. The questionnaires were distributed amongst these Research Institutions proportionate to the number of users of the Libraries in each of these institutes.

Number of users of library in
Institution ‘A’ X 766

Sample size for Institution ‘A’ (Total Sample size )

Total number of library users in all the institutions selected for the study

1.11.8 Questionnaire Design

A questionnaire was designed for the collection of data from the respondents. The questionnaire is annexed at the end of this thesis as Appendix II.
1.11.9: Testing of the Questionnaire

The questionnaire was first tested on respondents who happened to be not in the selected sample of respondents. This was done to ensure that the respondents did not have any problems in understanding the questions and also could easily mark their responses. Discussions were also held with them to ensure that the meaning they attached to each of the questions was the same as the researcher attached to them.

Later the questionnaires were administered to the selected respondents in each of the institutions.

1.11.10: Data Analysis

The data was analyzed using MS Excel Spreadsheet, using weighted mean and weighted standard deviation. Tables and diagrams with frequencies and percentages and Chi-square test were employed as and when required for analysis and interpretations of data. The statistical tests used are:

a. Chi-Square

Chi-square test is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis. (businessdictionary.com) In the present study, chi square test of independence is applied to test whether there is any significant association between different categories of users and frequency of visit to library, sources of learning, computer self-efficacy , purpose of accessing EIRs, location of accessing, value of EIRs and difficulties they are facing while using EIRs.

b. Z Analysis Test

A Z-test is any statistical test for which the distribution of the test statistic under the null hypothesis can be approximated by a normal distribution. Because of the central limit theorem, many test statistics are approximately normally distributed.
for large samples. For each significance level, the Z-test has a single critical value (for example, 1.96 for 5% two tailed) which makes it more convenient than the Student's t-test which has separate critical values for each sample size. (https://en.wikipedia.org/wiki/Z-test)

c. **Likert scale**: This is ordered one dimensional scale gives equal weight or attitudinal value to items or statements when reflecting an attitude towards an issues in a question. It is typically used to measure perceived similarity difference between products. This scale is generally done using five point scales. Respondents are asked to select from choice rating from strongly agree to strongly disagree. This is one of the extremely popular and widely used scales of measuring attitude.

**1.12: Scope and Limitation:**

Information is a vital resource and needed by everyone including scientists, research scholars and non scientific staff to perform research related activities and professional tasks. The users use EIRs in their quest for information. The users use EIRs, when these e-resources meet their information requirements, the usage of e resources will be increased, but when the same users face problems to find relevant information, it affects the use of e- resources. Keeping these considerations in mind, the present study has been undertaken to investigate the attitude and satisfaction of users regarding EIRs.

The scope of the study is limited to the Libraries attached to research institutes in Punjab only. Research laboratories affiliated to educational institutes have been excluded. The study covers only those research institutes’ Libraries which are approved by government of India and government of Punjab.
1.13: Chapterization:

The study has been structured into 5 major chapters

Chapter one: Presents background information, electronic information resources, objectives, hypothesis, methodology, scope and limitation and the significance of the study.

Chapter Two: Presents an overview of Electronic Information Resources

Chapter Three: Presents Review of the Literature in key areas of relevance to the thesis.

Chapter Four: Deals with Data Interpretation with testing of Hypothesis.

Chapter Five: Provides Summary of the main findings, Suggestions for improvements and points out possible areas for further research.
References:


Robb and Hicks (2010). Print vs. e-Journals: One Hospital Library's Quest for the Final Solution. Journal of Electronic Resources in Medical Libraries, 7(1), 70 — 78.


