CHAPTER-I

INTRODUCTION
1.1. Introduction

Information and communication technology (ICT) is one of the important adages of today’s information world. ICT is a product of information age and technology. It has been regarded as a vehicle for future development, opportunities, challenges and competition that enables information to be collected and used. ICT is a convergence of computers and communication technology, which makes processing, storage, and its retrieval very faster, instant and effective. On the other hand, it may be noted that the web technology (Hereafter web) is one of the most important and complex inventions of mankind. It is a powerful means of communication, dissemination, and retrieval of information.

The importance of the ICT and web in libraries can no longer be questioned, as it has transformed the way with which functions are carried out in libraries. Web has been used by libraries for providing access to information and services and thereby they have proved their existence on the web. This has resulted in transformation in the role of library and librarians. Further, web has also changed the traditional users as more techno-savvy and they are demanding and expecting their libraries to go for completely web based services.

With the advent of the web, the availability and accessibility of information in different electronic formats in libraries and other types of organizations have been made even easier because of the web’s graphic and interactive capabilities. These capabilities allow library users to search databases, view full text articles, including pictures and tables etc. This has resulted in higher acceptance of web as a tool from all types of organizations, not only for gaining access to information, but also as a means for
disseminating information with a wide range of target groups, level of services, resources, etc.

In today’s knowledge society, the value of having access to information is greater than having access to physical space. This brings up two important issues: the diverse needs of users for library resources and the importance of user awareness of library resources and services. Both of the issues have to be addressed in time and with higher rate of satisfaction. Library website is a tool which would help libraries to fulfill both of the objectives. As libraries shift services on to the web, the library website becomes a service in its own right. It becomes an important tool for showcasing collection details, services offered and new initiatives from the library. Thereby, websites may become a means to advertise or market. In addition, users of the library can be made aware of the collection and services in an easy manner, so that, they will have less reason to visit the library physically. Library website not only provides the basic details of the collection and services of the library, rather information on the inception and vision of the library, working hours, procedures, contact details and access to all e-resources. Homepage of the library website is a single point for marketing the resources and services of the library. In addition to the collection, details of the list of new arrivals and access to Online Public Access Catalogue (OPAC), Really Simple Syndication (RSS) feeds, access to blog also can add value to the library website. Providing access to OPAC will help users to search for availability of a specific resource not only in their library but also in other libraries of the same research agency. This is possible with the effective implementation of union catalogues. With all these, library website makes it easy for the staff members to cater to the needs of the users of different levels i.e. researchers, faculty members, scientists, technical staff and students.

The design of library website is not a onetime process, it is dynamic and there have been instances where substantial changes are incorporated for a better quality. One such example relates to the Health Science and Human
Services Library (HS/HSL) of the University of Maryland, Baltimore. “The library's original Website was developed in 1996. Although changes were made over the next three years to enhance the site, it became apparent through informal observations and comments from staff and library patrons that the time had come for the website to be completely restructured. Another example relates to the study conducted by “American Academic library websites in 2000 – 2010” by Aharony (2011). The study reveals that, the content of academic library websites of America in the years 2000 and 2010 has changed much over the ten years, presenting an increasing use of e-resources and Web 2.0 applications, as well as a focus on library users and great use of graphics in websites. Both the studies reveal the fact that, there will always be a need for a continuous evaluation of the library websites keeping users needs and emerging tools and technology, in view. Hence, design of a website requires a careful planning, considering several key design elements, visual and aesthetic appearance. The utility of the website, for e.g. how well it functions and its usability for e.g. how effectively users can navigate it are also key factors. Nielsen (2000) determines that “people do not come to the Web for an “experience” they come for information. This is especially true for the users of library Websites, where finding reliable information quickly and easily is important.” Keeping all these in view, library websites have to be developed by using the state of the art technologies.

In addition to website, Web also provides a means for users to express themselves; it allows for freedom of speech and ideas, and allows users to meet and communicate who would not ordinarily ever have met. As long as the Web retains these qualities of freedom, it will also remain unmonitored and unregulated. This, therefore, leaves a large responsibility on users. It is up to the user to carefully and critically evaluate the Web sites which they use as information source. Some organizations and institutions are designing their own library websites. It has been observed that, despite the effort made by the in house expert or outside agency, most of the library websites are not updated
regularly. At the same time, the contents and information available on the library websites are also not up to the mark (Bhattacharjee, Sinha & Manoj, 2006). Many libraries have created websites to serve their patrons and the general information community, but how useful are these websites beyond providing information about the library and its collections is yet to be fully explored because even a high quality library may have a low quality website and low quality library may have high quality website.

1.2. Review of Literature

Review of literature is an important process in conducting research. This reviews the similar works done on the topic, found in journal articles, reports, seminar papers and other publications. In the present study, existing literature on the topic has been collected exhaustively and has been presented under five sub headings.

a. Evaluative studies on library websites of R&D Institutions

Karla & Verma (2011) carried out a study on library websites of R&D institutions of ICAR, ICMR and CSIR to evaluate for usability and usefulness features. Findings of the study made it clear that, there were many inconsistencies in use of language on the websites, use of navigation.

b. Evaluation through descriptive studies

Ongus, Kemparaju, & Nymboga (2006) conducted a study on selected university websites designed in English. All of which were subjected to a uniform set of criteria for the purposes of evaluating the website design and content coverage. It is apparent from the study that the quality of university website design does not universally have a meaningful effect on web content quality, even though the seemed to be strongly correlated in this study. It is advisable, therefore for users to prudently use the websites and where necessary, consult well trained librarians and other knowledgeable information professionals.
c. **Evaluation through users’ perception**

Pareek & Gupta (2012) conducted an evaluative study of 12 library websites in Rajasthan during Sep- Dec 2010. Libraries were from different areas general universities, special universities and Research institutions. Purpose of the study is to find out how libraries are given access to their services and resources and how e-resources have been shared among different libraries. The study shows that information sources and services available on the websites vary from one to another.

d. **Evaluation using web based tools**

Mummadi, Kusneniwar & Chappa (2015) conducted a study to evaluate Readability of patient education materials related to diabetic diet from the Indian Diabetic Association website www.diabetesindia.com and compare the similar topics from five most popular health information providing sites. Tools used for Readability of selected website data are: Gunning Fog index (GFI), Coleman–Liau index (CLI), The Flesch-Kincaid Grade Level (FKGL), Automated Readability Index (ARI), Simple Measure of Gobbledygook index (SMOG) and The Flesch Reading Ease (FRE). Study found that Indian website is good at readability when compared to other popular health information providing websites.

e. **Evaluation models**

A study conducted by Manzoor & Hussain (2012) is a reflection on a usability evaluation of educational websites for the subject of modeling web usability guidelines for educational websites. This paper investigates usability of higher educational websites in Asia. First, an online Google application survey form was designed using Google Forms and used for the evaluation of web usability and student response. After a thorough analysis, a concise model was designed to evaluate the usability of educational websites called "Web Usability Evaluation Model" (WUEM). We evaluated ten top-ranking engineering universities in Asia against the features listed in the WUEM.
Chapter III on review of literature analyses the subject in greater details.

1.3. Need for the study

Research and development (R&D) libraries have realized their responsibility towards making research output easily accessible to all the users. They are using their websites as a medium through which they are reaching the potential users. Since, the website of library is its reflection to the users, it ought to be seen as an integral part of the institution, rather than an external entity. Hence, all facets of the library and its functions should be appropriately reflected on the website.

The library Web site can and by default does play a variety of roles. A library Web site often serves the role of a library workstation, both for the users and for the librarians serving them. In the role of library workstation, a library Web site serves as a delivery mechanism for databases, electronic texts and journals on different research areas, and often for the library catalogue. Additionally, a library Web site can become an agent for archiving and retaining information that appears on other sites, for the purpose of future research. In addition to the resources, website can play a key role in delivering electronic services to users within short span of time, as users in R&D will be having very less time to visit the library to use the services. Finally, an all-important function of the library's Web site is to serve as a communication tool for a library and its user community. It is a way to advertise the physical presence and location of the resources and also to inform the users about the staff in charge and services provided by these staff.

Growing reliance on the web to deliver library services and resources has made R&D libraries to pay attention on how effective their websites are and how easy they are to use and navigate, since, the website of the library provides an access point for the users to gain an insight into the information products and services available in library. Hence, there is a need to critically assess the quality of websites to determine the extent to which they meet user’s
needs, as number of users’ who visit the library is relatively more through its websites.

Though, designing of a website seems to be one time job, it needs continuous updating, as it helps keeping the content relevant with user needs. Website evaluation is a necessary process to enable planners and developers to keep up with the increasing diverse needs of the users and technological advances. It is also imperative to evaluate websites for quality control.

Literature shows that, various criteria have been applied to evaluate the websites. However, user survey and descriptive method have remained the foremost methods of website evaluation. Very few studies are based on web evaluation tools and heuristic evaluation approach or through cognitive walk through. Further, a body of literature pertaining to the systematic study of websites content and structure is still developing. Literature review has revealed that, no study has been done in R & D sector particularly, those pertaining to GOI funded institutions and their library websites and exclusively indicating relationship between disciplines of the institutions and quality of the library websites. Keeping this background in view, and the growing interest and interaction of the user community with websites, an attempt is made in the present research work to study the various features present on the library websites of R&D institutions of GOI, belonging to different disciplines.

The findings of the study would help the website designers to reorient their website content based on usage trends. The designers can continue to link the most used resources and consider removing or replacing the services and pages with minimal use and revamp the type of navigation used.

1.4. Statement of the Problem

Title of the current study is “Library Websites of R&D Institutions of Government of India: An Evaluative Study”.
Operational Definitions:

Library Website: A Library Website is a set of related WebPages of information on the internet about a particular library published by an organization.

R&D Institution: R&D institution is an establishment endowed for doing research.

Evaluative Study: Evaluative study refers to critical appraisal or assessment of the value, worth, effectiveness of websites.

1.5. Objectives of the study

The present study of evaluation of the websites has been conducted in two phases. Phase one involves the evaluation of the websites by the researcher, while phase two involves evaluation of the websites by the users of the websites. Accordingly, the objectives have been categorized into two sections.

Researchers’ Perspective:
To evaluate the library websites of R&D Institutions for
- Authority
- Links provided
- Scope and quality of the content
- Design and Development features
- Use of SEO features
- Validation and accessibility errors

Users’ Perspective:
To evaluate users’ ratings for
- Homepage features of the library websites
- Quality and presentation of the content of library websites
- Navigation features, page titles and headings present on library websites
- Links provided on the library websites
• Search facility made available to users on library websites
• User assistance made available on the library websites
• Value additions included on the library websites
• Suggest a strategic model for library website for R&D Institutions

1.6. Research Hypotheses

Two null hypotheses for the study are

There is no statistically significant difference between disciplines of the R&D institutions and

• Links used on the library websites
• Scope and Quality of the content provided on the library websites
• Design and Development features provided on the library websites
• Validation and accessibility errors found on the library websites

There is no statistically significant difference in users’ ratings between disciplines of the R&D institutions for

• Homepage features
• Quality and Presentation of the content
• Navigation features
• Page Titles, Headings and Highlighting of critical factors
• Links provided
• Search facility provided
• User assistance provided
• Value additions provided

1.7. Research Design

A research design is a logical and systematic plan prepared for directing a research study. It specifies the objectives of the study, methodology and techniques to be adopted. It provides blueprint for the collection, measurement and analysis of data.
Present research design consisted of formulating the research problem, comprehensive review of the literature, defining the scope of the study and its limitations. Further, research design also includes the development of hypotheses, collecting, processing and analyzing of data and enumerating the inferences and conclusion.

Formulating the research problem facilitated the researcher in deciding the relevant and irrelevant data. Data collection is of paramount importance in this research design as this facilitates collection of both qualitative as well as quantitative data about a research problem.

In the first phase of the study, web design and evaluation checklist developed by Government of India (GOI) was used to evaluate the websites by the researcher and in the second phase, questionnaire was used as a tool to receive responses from the users’ of library websites.

1.8. **Methodology**

The methodology of the study is a composite one, as it is a combination of more than one research method.

**a. Designing of the checklist**

In the first phase, descriptive method was used to evaluate the library websites of R&D Institutions of India. Evaluation checklist was developed based on the guidelines suggested by GOI for their websites. Checklist was modified to include new features on the websites, that were observed, when accessed for study and were found to be significant for consideration for evaluation. Items in the checklist were converted as questions in Dichotomous (YES or NO) and three, four or five point grading scale, wherever possible. Likert scale has been used for grading questions. Features listed in the checklist, have been evaluated with a combination of automated tools for web evaluation and preliminary manual evaluation by the researcher through observation. Automated tools generally reveal around 25 per cent of the
accessibility issues on a website and are useful to obtain a good quantitative view about the state of its accessibility (Nirmita, Mukesh & Dinesh, 2014). Preliminary manual evaluation is necessary to supplement the results of the automated test and provide a more qualitative analysis of the accessibility and usability issues encountered (Nielsen & Tahir, 2001). In the present study, the automated tools Pingdom Speed Test, SEO Quake, Wave Web Accessibility Toolbar, Web Developer Toolbar, Functional Accessibility Evaluator, Achecker, W3C Validator, Readability Scorer and Broken Link Checker have been used to test the features listed in the checklist. This evaluation process was carried out from Dec 2013 to Mar 2014 during 8pm and 9pm, using the reliance dial up data connection with a speed of 3.2 mbps.

b. Questionnaire Designing

In the second phase, survey method was used to collect data from the users of library websites of R&D Institutions in India, under study. Questionnaire has been used as a principle tool for data collection. Questionnaire for evaluation was developed based on the extensive review of existing literature on library websites of academic and research institutions at global level, India and Karnataka state and keeping objectives of the study in view.

c. Testing of the Questionnaire

The questionnaire was tested by conducting a pilot study on a sample of seventeen R&D library websites of Bangalore. This was done to ensure that the respondents did not have any problem 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. On the basis of discussion, modifications were made wherever necessary to make the questionnaire more clear to the respondents.
The final survey questionnaire was hosted on the web https://docs.google.com/forms/d/1O6bTrOuteUyFKwwWwTTfHJvL8y3WmAEoNzMex6lx_EPk/viewform?usp=send_form using Google Forms and users were communicated through emails with a link to access questionnaire. Link was shared with the help of staff members of the concerned libraries. Further, users were requested to fill the online questionnaire and submit the same to the researcher. Total 950 questionnaires were shared with the potential respondents from R&D institutions. Out of the 950 questionnaires sent, 422 (44.42%) were received filled. Survey was carried out from Dec 2013 to Mar 2014.

1.9. Selection of the Institutions

132 library websites of R&D Institutions of GOI were selected for this study. These institutions were listed in the “Directory of R&D Institutions 2010” as GOI R&D Institutions. Further, these institutions were categorized as following on the basis of the discipline.

- Agricultural Sciences
- Medical Sciences
- Natural and Applied Sciences
- Social Sciences

Table-1.9.1: Categorization of R&D Institutions

<table>
<thead>
<tr>
<th>S. No</th>
<th>Disciplines</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agricultural Sciences</td>
<td>47</td>
<td>35.61</td>
</tr>
<tr>
<td>2</td>
<td>Medical Sciences</td>
<td>24</td>
<td>18.18</td>
</tr>
<tr>
<td>3</td>
<td>Natural and Applied Sciences</td>
<td>57</td>
<td>43.18</td>
</tr>
<tr>
<td>4</td>
<td>Social Sciences</td>
<td>04</td>
<td>3.03</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>132</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

List of R&D institutions have been provided in the appendix III
1.10. Study Population and Sample

Respondents were selected on the basis of “Required Sample Size Table” from the Research Advisor (2006), with a margin of error at 5 percent and confidence level at 95 percent. Total number of users from 132 R&D Institutions was 6718. Of which, 4398 were Scientists or Researchers and remaining 2320 were technical staff. According to the research advisor sample table, 365 had to be selected from the total population. Anticipating non-response, the questionnaires mailed were more than required, i.e. 500 for Scientist or Researchers and 450 for technical staff. A total of 422 (44.42%) filled in questionnaires were received back from the respondents.

UNESCO Institute for Statistics has categorized R&D personnel into three categories based on the nature of work they perform. Scientist/Researcher, Technical Staff and Support Staff are the three categories. Since, scientists or researchers and technical staff are directly involved in research activities they will be in need for latest information in the field of research (UIS, 2014). However, it was found in certain cases, that Scientists were also part time faculty members or doctors. This was found in the institutions of Agriculture and Medical Sciences. For the sake of defining status parameter under study, this aspect has been ignored and it was considered that they had filled up this information based on their main contribution and involvement in the activity in a formal way.

<table>
<thead>
<tr>
<th>Category of users</th>
<th>Total No. of users</th>
<th>Distributed</th>
<th>Responded</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists/Researchers</td>
<td>4398</td>
<td>500</td>
<td>219</td>
<td>51.90</td>
</tr>
<tr>
<td>Technical Staff</td>
<td>2320</td>
<td>450</td>
<td>203</td>
<td>48.10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6718</strong></td>
<td><strong>950</strong></td>
<td><strong>422</strong></td>
<td><strong>44.42</strong></td>
</tr>
</tbody>
</table>
1.11. **Data analysis**

Data analysis is critical examination of the data collected for studying the characteristics of the object under study and determining the relationship between the dependent and independent variable. Data analysis also helps for acceptance or rejection of hypothesis.

Data collected from the descriptive study and user survey were fed to MS Excel 2007 and Statistical Package for Social Science (SPSS V.16) and the output was checked to correct any typographical errors. Statistical analysis of the data was done with the help of SPSS. Further, same tool has been used for presenting frequency distribution tables, graphs and other tables of variables to establish relation between them.

**Statistical tests used:** Chi-Square test of independence and Z test have been used in the present study.

- **Chi-Square Test:**
  
The Chi-Square test of independence is applied to test whether there is any significant difference in the disciplines of the R&D institutions and library websites. On the basis of contingency table, the test for independence of variable is carried out by computing $\chi^2$.

- **Z Test:**
  
Z-test is 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.
• **Likert Scale:**

   Likert scaling is a one dimensional scaling method as an instruction to the people who are going to create or generate the initial set of candidate items for scale techniques. Using this, a set of potential scale items can be created that are normally rated on a 1 to 5 or 1 to 7 rating.

1.12. **Scope and Limitations of the study**

   In India, there are 611 R&D Institutions, functioning under central sector or governed by GOI. Of these, only 132 R&D institutions are having websites for their libraries. Thus, only these websites were considered for the study.

1.13. **Organization of the study**

   The thesis is organized into following chapters:

   **Chapter I:** Introduction deals with need for the study, objectives, hypothesis, methodology used and scope and limitations of the study.

   **Chapter II:** R&D Institutions in India, categorization of R&D institutions, libraries in R&D Institutions, guidelines for website design, Evaluation of websites, guidelines for evaluation of websites, Library websites for R&D institutions, evaluation of R&D library websites in India.

   **Chapter III:** Review of literature, reviews the earlier important studies related to library websites, with emphasis on the evaluation.

   **Chapter IV:** Data analysis and interpretation with testing of hypotheses

   **Chapter V:** Provides summary of findings, suggestions for improvements in library websites and suggests possible areas for future research.
References


- Pareek, Sarwesh., & Gupta, D. K., (2012) Information about Services and Information Resources on Websites of Selected Libraries in
