3.1. Introduction

Review of literature is an important process in conducting research. This process reviews the similar works done on the topic found in books, journal articles, reports and dissertations. Main purpose of this is bringing together all relevant and important works done on the topic. It includes methods used, findings of the study and suggestions made for further improvement. This also helps avoiding the duplication of research work and improves the understanding of the research problem.

Various research studies related to the present research problem “Library Websites of R&D Institutions of Government of India: An evaluative Study” conducted in India, as well as in other countries have been reviewed. These studies relate to the different aspects of web designing, standards to be followed for designing websites, content analysis of the websites, evaluation criteria for websites and tools used for evaluation.

Literature shows that, studies on Website design and development have begun in the year of 1995 onwards in the international scenario. However, very few studies have been reported in the Indian context. Here, an attempt has been made to review the literature published on the different areas of the web design and development process. Besides, major focus is given for the literature published on the studies of Design and development of websites for libraries and evaluative studies conducted in India as well as at the international level, and methodologies followed for evaluation of websites.

In an effort to find out the existing literature on the research topic and its related areas, a thorough literature search was conducted. Several primary and
secondary sources of information were consulted to review the literature pertaining to the study.

Below is the list of sources of information consulted for the review

- Library and Information Science Abstracts (LISA) from 1969 to Mar 2010
- Library Information Science and Technology Abstracts (LISTA) From 1960s to till date- Published by EBSCO
- Dissertation Abstracts International, UMI
- ERIC database-Published by Silver Platter
- Emerald Insight Full text e-journals from UGC-Infonet
- Full text e-journals from DOAJ

Efforts were made to identify the original full text articles based on the LISA abstracts. In addition, the scientific journals, books, reports and other information resources available on the web have been the sources of information for the review. Different studies have been arranged in a chronological order. APA style has been followed for references.

3.2. **Related Literature Review**

For the purpose of convenience, this chapter has been structured into five parts:

- Evaluative studies on library websites of R&D Institutions
- Evaluation through descriptive studies
- Evaluation through users’ perception
- Evaluation using web based tools
- Evaluation models

3.2.1 **Evaluative studies on library websites of R&D Institutions**

Very few studies have been conducted on evaluation of library websites of R&D Institutions. A study conducted by Diaz (1998) shows that quality
reference and user service requires a combination of having the right resources, making sense of them for the user, and providing the right services in the right time and place in research environment. Reference and user service librarian’s work has involved developing all aspects and the Web has had a great impact on each one. Many articles in Reference and User Services Quality (RUSQ) have studied the impact of Web resources and questioned the implications for service.

Cohen & Still (1999) explores a comparison of the library websites of Research Universities and two year college library websites. Library home pages of fifty Ph.D. granting institutions and fifty two year colleges were selected to determine purpose as manifested by their content and its placement within the structure of the site. By looking at the library Web sites of contrasting institutions, the authors identified those aspects of the sites that reflect institutional character. They further identified a core common content that exists across library Web sites independent of the parent institution.

Joicy & Verghese (2011) made an attempt to evaluate, how the R & D Institutions in India present their content on the websites. Out of the 246 Research and Development institutions identified from the website http://www.indiaedu.com/research-institutes/research-institutes-india.html, 77 (31.30 per cent) properly functioning websites were analyzed. The study revealed that majority of the Research and Development institutions in India provide informative links to contacts, copyright, news and events, RTI and history. A few websites provide opportunity for user interaction in the form of feedback. It is also found that majority of the research and development institutions websites are good to navigate and find information.

Karla & Verma (2011) made an attempt to evaluate the library websites of selected research institutions in India both quantitatively and qualitatively on the basis of Web Impact Factor, pre-defined check list of indicators, and online questionnaire survey. Studies the existing procedures and practices of
evaluation indicators of websites at national and international levels as reported in the literature. Data reveals that there are many inconsistencies and terminological issues and many effective methodologies/techniques for websites evaluation which are practiced at international level but are not being used in such studies in India. Two major quality components viz. ‘usability’ and ‘usefulness’ covering the various evaluation indicators at ‘indicative’ and ‘illustrative’ level have been examined. Study concludes that there is scope of further research for developing and standardizing the indicators with multiple evaluation perspectives at various levels. Study suggests the active and crucial role of library and information scientists in the evaluation process from design to content management in future.

Research centers are among the most important institutes in a scientific society. Using the AltaVista search engine and webometric methods, this research tries to find the performance and impact of the top research centers of the Islamic World Countries. The results reveal that from 57 countries, 40 of them did not have any research centers scored in webometric ranking and the rest of them had not been scored well in the webometric ranking model. In this study, we rank research centers’ websites based on some webometric indicators such as number of pages, linkages, WIF and Revised WIF. Findings show that the ranking of the websites based on the WIF and revised WIF is almost different and there is a strong correlation between the number of research centers in the Islamic countries that were scored in webometrics and their ranks based on countries’ GDP (Goltaji and Shirazi, 2012).

The website of an institution can be used for many purposes, enable the users to get more information and idea of the particular institution or company. Webometrics is the research of network-based communication using informetrics or other quantitative measures. As a study, the ICMR institutes in India have been taken and their link structure has been analyzed. Moreover this study concentrates on the Classification of Websites by webpage size, WAVE Web AIM Accessibility Error, Various Search Engine performances, the
difference between pages in various time intervals and Number of rich files has been calculated. It also presents the Link – network diagram of ICMR institutes using Pajek Software (Jayshankar, Sujitha & Valarmathi, 2012).

Sonwane (2012) explains the importance of providing quality information, speedily and pin-pointedly in Scientific, Educational and Research Institutions. This helps to meet information needs of the decision makers, research scholars and scientists for their intended reasons. Due to the developments in IT, e-resources are playing important role in dissemination of knowledge. Nearly every institute is developing its own web site. The users interested in pursuing a research career in Scientific and Research area access the websites for authentic and reliable information. To determine value or goodness of information provided implies the necessity to evaluate the information provided on their web sites on Internet. The present study “Websites of Scientific Research Institutions in India: An Analytical Study” was carried out on 277 Scientific and Research Institutions and libraries of these institutions. Information was collected from their web sites as well as using a structured questionnaire separately designed for web designers. The data was tabulated and analyzed. The rating system was developed and has been presented.

A study conducted by Sami & Basavaraj (2013) explores library websites of R&D institutions located in Bangalore for their design features. Web evaluation guidelines suggested by Keevil have been used for evaluation. Results of the study show that websites are keen on providing their basic details. Overall content organization of the websites is not up to the mark. Use of multimedia has been neglected by majority of the libraries.

Another study by Sami & Basavaraj (2014) focused on evaluating how library websites of Agriculture research institutions are structured to ensure their usability and usefulness. General information about library, effectiveness of the homepage, content presentation, type of navigation used, type of user
assistance made available, search facility provided and value additions included on the websites are the parameters on which evaluation is carried out. Study has resulted in few major observations. First impression of the homepage is critical for successful user satisfaction and it makes user to revisit the website. Despite of its essence it has not been achieved widely. Similarly, Study revealed that there are few more areas where improvements are required. Use of graphics and multimedia for effective content presentation, virtual help to users, facility to search within the website and WWW and provision for OPAC on library websites are to name few.

A doctoral study conducted by Karla (2015) shows that library websites of CSIR, ICMR and ICSSR have been rated inconsistently for the features such as learnability, efficiency and effectiveness. Overall outcome of the study shows that there is a major inconsistency for the features on the websites of all three categories.

3.2.2. Evaluation through descriptive studies

Article by Houghton (2000) describes the design and implementation process for developing an academic library website at De Montfort University (DMU) and gives practical guidance and advice. Aim of the website is to provide access to quality information services for students and staff at a large decentralized university. Article discusses resources and subject areas that are specific to DMU’s teaching and learning environment. However it aims, where possible, to give generalized advice to any academic library that is considering building a website in the hope that others will benefit from the DMU experience.

Alastair (2001) conducted a study on applying evaluation criteria for New Zealand Government Websites. Criteria were adapted from Eschenfelder & Beachboard (1997) guidelines and applied to a sample of five websites of NZ government entities. Issues that arose in applying the criteria are examined, and lessons for designers of government websites explored. In particular, it is
important that websites provide orientation information, that conditions for re-use of information be made clear, that privacy concerns be addressed, that print materials be properly adapted to the web environment, that materials be kept current, that contact details be available, that metadata be used effectively, that external links be made appropriately, that pages be accessible to users with disabilities, and that help information on search engines and other facilities be made available to users.

Archana & Kabir (2010) made an attempt to understand and analyze the presence and presentation of libraries of Engineering Colleges (EC) in Kerala in their respective websites. On the basis of the reviewed literature and an observation of libraries of nationally important institutions imparting technical education in India, a set of criteria were developed for analyzing the websites/web pages. The library websites were then ranked on the basis of this analysis. It is observed that majority of the websites of ECs in Kerala have least representation of their respective libraries. Another important observation is that even the highest scoring libraries satisfy only half of the criteria listed for analysis.

Augustine, Susan, Greene & Courtney (2002) conducted a study to understand how metadata and search engines will play a major role in determining the usability of library websites. Results of this usability study reveal that students consistently and frequently use the library Web site’s internal search engine to find information rather than navigating through pages. If students are searching rather than navigating, library Web page designers must make metadata and powerful search engines priorities. The study also shows that students have difficulty interpreting library terminology, experience confusion discerning difference amongst library resources, and prefer to seek human assistance when encountering problems online. These findings imply that library Web sites have not alleviated some of the basic and long-range problems that have challenged librarians in the past.
Kim & Stimatz (2002) examine the role of the instructional services staff in the evaluation of the library Web sites of the Academic Affairs Library of the University of North Carolina at Chapel Hill. Study focuses on the issues of the Web site usability study in a large academic library where a number of departments are involved in the development and maintenance of the Web site. The authors put emphasis on the collaborative nature of the usability studies in a large organization.

Shelstad (2005) made an attempt to examine the redesign of an academic archive and manuscript repositories of fourth-generation website. A review of the process used by a task force to revamp a website, including determining the goals of the site, its main features, audiences, vendor and software selection, relationship to the parent institution’s design guidelines, and user testing results. Only with the cooperative effort of staff, interested outside parties, and users will web redesigns be worthwhile efforts that translate into sites with depth and meaning.

Davarpanah & Khaleghi, (2006) presented a study, which aims to evaluate websites freely available on the internet from one country – Iran and to provide information about the quality of their content. General quality criteria were used for the evaluation. These included ownership and authorship, type of websites, purpose and scope of the sites, language, links, domain types, currency/updating of information, accessibility, services and facilities. Thus, in May and June 2004, 328 websites were selected using Yahoo, Google, Lycos, Iran Digest, and A Guide to Iranian Websites, to conduct searches. A check list was drawn up to review the information from the tools. The research revealed that among Iranian websites providing information on the internet, private sites were much more likely to be of poorer quality compared to sites of governmental organizations. Because there are no authoritative search engines which are specifically Iranian, the data were collected by using a selection of five search tools over a limited period of time. Using only these search tools, 3735 websites were found. While this paper has surveyed the content of the
websites, more research is needed to highlight the nature of the internet infrastructure and its use in this country. The websites of each country are regarded as a prime national gateway of information. The paper uses other work on evaluating national web presence and gives clear insight into Iran's websites and gives a model for evaluating the national web presence in any one country. Based on the results, national digital strategies can be devised to help make progress towards an effective and high quality national portfolio of websites.

Mounissamy & Kaliammal (2006) explore that the publishing industries are increasingly using web for providing online information resources. The electronic journal subscription by individuals as well as institutions rather than physical holdings is becoming order of the day. IITs and NITs provide access to databases and electronic journals via the online catalogue and the web to the end-users. They further describe the experiences and promotional ways adopted in the libraries of IITs and NITs for the effective use of electronic resources using library web sites.

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. University website designs in developing and developed countries should adhere to globally accepted norms of website construction, in order to achieve optimum results.

Angadi (2008) explored in the study on library websites of Deemed Universities in India that, websites are good in providing navigational features
but, consistency has to be ensured to achieve higher user satisfaction. Other features such as links used, quality of the presentation, user assistance and heading features have been used wisely.

Nathan, Paul, Yew & Murugesan (2008) made an attempt to report web usability and to identify and prioritize key web interface usability factors (WIUFs) for web sites of 36 student-related online services categorized into three groups: personal services, purchase services and study-related web sites. In this study, involving 400 student internet users (SIUs), 12,310 data points were collected and analyzed using a multiple linear regression test. Seven WIUFs were tested: use of color and font (UCF), use of graphics and multimedia (UGM), clarity of goals in web site (CGW), trustworthiness of web site (TOW), interactivity of web site (IOW), ease of web navigation (EWN), and download speed of web site (DSOW). The study results reveal that every online service category has a different set of crucial WIUFs. SIUs' web usability preferences were compared with those of general internet users. The participants were all Malaysians; therefore, generalizing the findings to all SIUs will require a confirmatory study with SIUs from other parts of the world. Web developers can use the results to design usable web sites for specific online service categories. The research offers a simpler alternative to measure web usability and to determine which WIUFs are crucial for a specific online service category with consideration of the users' role. This study overcomes some weaknesses of previous studies, i.e. small sample size, no consideration of product-task relationship, no specific customer group and cumbersome procedures.

Raju & Harinarayana (2008) have done a review of thirty library websites of top science universities around the world for their design features with special reference usability. The guidelines suggested by National Cancer Institute have been applied to measure the usability features of the selected websites. The parameters like optimizing user experiences; link back to home; color link behavior; navigability; and multimedia features have been studied for
the websites. The results showed that only 53.33% of library websites provide Frequently Asked Questions (FAQs). The time out option has been neglected by all the websites except one. It is noticed that only 39.99% of the websites have provision to explicit home links as well as through logos. Persistent navigation feature is observed only on 50% of the websites. Only 8% of the websites use the de facto link color coding. Library websites are yet to exploit the advantages of multimedia (interactive features). It is found from the survey that only 30% of the websites contain video contents and none of the websites contained exclusive audio files.

Libraries spend increasingly large amounts on electronic resources (ERs), but may not have adjusted staffing to support these resources. Assisting users with ER access problems is complex due to the many reasons a resource may be unavailable at a particular time. The objective of this paper is to describe the evolution of a library ER problem-reporting help desk. A pilot project was undertaken by librarians at the Texas A&M University Libraries to redesign workflows and staffing to provide an efficient, effective help desk service for solving ER access problems. Including librarians with experience in licensing and managing ERs in providing help desk services improved response time, problem resolution, systematic information capture, and service expectations and policies, and also led to the development of an ER Helpdesk database with enhanced functionality (Taryn. E, 2008).

Hackett & Parmanto (2009) conducted a study to determine, if the homepage of a web site is representative of the whole site with respect to accessibility. Paper presents an intra-class correlation (ICC) between homepage web accessibility barrier (WAB) scores and the WAB scores of web site levels 1 through 3 for 33 popular web sites. Study found that, the homepage is not sufficient to detect the accessibility of the web site. ICC of the homepage and average of levels 1-3 is 0.250 (p ¼ 0:062) and ICC of levels 1, 2, and 3 is 0.784 (p, 0:0001). Evaluating the homepage and first-level pages gives more accurate
results of entire site accessibility. This is the first study correlating homepage accessibility with web site accessibility.

Jeyshankar & Ramesh (2009) examine and explore through a webometrics study, the websites of 45 Universities of Tamil Nadu comprising of 27 state and 18 private universities. The study identifies the domain system of the websites; Analyses the number of web pages and link pages, and calculates the simple Web Impact Factor (WIF), self Link web impact factor and external web impact factor of the University websites in Tamil Nadu and ranks the websites as per the WIF. Reflects that some universities in Tamil Nadu have higher number of web pages but correspondingly their link pages are very small in number and websites fall behind in their simple, self link and external link WIF.

Alkindi & Bouazza (2010) stated in their study that merely putting enough data on library website may not help its users. Rather proper organization of information on a Website is vital. Organization of information on website decides the user’s satisfaction level. Establishing of navigation and search systems needed to organize information on academic Websites, and to address key questions in relation to information access and to the use of these systems. This is achieved through the evaluation of two Websites (Dhofar in Oman and Monash in Australia) and their comparison with Google, using standard criteria identified in the literature. The outcomes will support designers of academic Websites and will support students in accessing and retrieving information. The main findings of this research is that Google and Monash University Websites have established search and navigation systems that support Website accessibility, which enhance site usability while Dhofar University Website uses navigation systems only because of content reasons Usability is a prime factor in any Website. This is even more important when the website is designed with commercial purpose.
Haneefa & Venugopal (2010) analyze content analysis of national library websites of Asia. Data were collected using a checklist from 28 national libraries websites during November 2009. Analysis shows that the websites of national libraries of Asian countries have a common pattern of content and design. Only six national libraries websites have deployed one or more Web 2.0 technologies.

Konnur, Rajani & Madhusudhan (2010) conducted a study of the Web sites of academic libraries in Bangalore City, India. Web sites of five academic libraries from five universities or research institutes located in the city are considered. Web sites are evaluated in terms of efficiency of information retrieval, copyright status information presented and online reference desk assistance. Computer graphics and overall ease of use of the Web sites are examined. A rating is presented of the five individual academic library Web sites and an overall need to improve usability and to incorporate Library 2.0 features is noted.

Akakandelwa (2011) in his paper made an attempt to evaluate selected Southern African Development Community (SADC) governments' web sites with regard to their language, content, currency, interactivity, and visibility. The study adopted both content analysis and link analysis methods. The findings show that all the SADC member states surveyed had web sites, whose statuses were at diverse development stages. The majority of the web sites were written in English while a few were bilingual and one was multilingual. Most of the web sites did not provide their dates of copyright or update. The majority of the web sites had government publications such as constitution, government reports, national development plans, and annual budgets. Only a few had information on parliamentary and presidential elections. Most web sites lacked vital statistics, calendars of forthcoming events, and facilities for feedback. Furthermore, the web sites varied with regard to their levels of interactivity and visibility. The survey was limited to English speaking SADC countries and some French-speaking countries whose web sites had an English version. The
findings of this exploratory study may be used to help improve the design and development of government web sites in SADC and other countries in the Sub-Saharan Africa.

Anwarul & Alam (2011) conducted a webometric study of all University websites in Bangladesh. Data for the study was obtained using AltaVista search engine, which was used to rank the website based on webometrics indicators. It is found that some universities in Bangladesh have higher number of web pages but their link pages are fewer and websites fall behind in their web impact factor. Some suggestions to improve the web impact factor of the university websites in Bangladesh are given.

A study by Gottfried (2011) is an examination of access to business research resources through academic library websites, including research databases, catalog services, research guides, and business librarians. The websites of 114 academic libraries serving top business programs in the United States were studied. Results reveal a wide range of access to business research databases among the schools studied (anywhere from 11 to 100 business databases available). More than 95% of the schools provided business research guides, and nearly all schools provided at least some contact information for business librarians.

Herring (2011) made an attempt to study school libraries and reported that, school libraries are becoming increasingly virtual in nature. Online resources have become more important, more relevant, and more up-to-date than print resources such as books, and students are increasingly demanding access to these online resources. Consequently, Web site evaluation is becoming a more crucial role for the school librarian. This article seeks to highlight why Web site evaluation is so important and what criteria the school librarian might reflect on and use when mediating resources for students and staff in the school.
Islam & Alam (2011) presented a study to analyze the websites of private universities in Bangladesh according to the webometrics indicator. It examines and explores the 44 private university websites in Bangladesh and identifies the number of web pages and link pages, and calculates the Overall Web Impact Factor (WIF) and Absolute Web Impact Factor (WIF). In a cross-sectional study, all the websites were analyzed and compared using AltaVista search engine. The websites were then ranked based on these webometric indicators. The study revealed that some private universities in Bangladesh have higher number of web pages but their link pages are very small in number, thus the websites fall behind in their Overall WIF, self link, external links and Absolute WIF. Finally, it is showed that these universities did not have much impact factor on the web and were not known internationally. The major reasons are discussed and suggestions to overcome the problems are presented.

Shivakumar (2011) evaluated the effect of web searching on OPAC users in the university libraries in India. It is a comparative study of the three universities in the Union Territory of Chandigarh and Punjab State. The study showed that a majority of the users in all three universities made use of the web-based resources. Ready access to information through search engines considerably increased the expectations of library users while searching OPAC. Web searching influenced their OPAC searching process greatly, as the majority of searches were performed on OPAC-like popular search engines. Simultaneously, users did not know the difference between inner-workings of OPAC and common search engines such as Google. The paper provides useful information about how search engines influence OPAC users in India. The study recommends that OPACs need to include the modern features of present search engines to improve their practices. University libraries should communicate user expectations to OPAC designers. Further, the library community should collaborate with OPAC designers to develop a user-friendly OPAC system, keeping in view the needs of the users of the internet age.
Aharony (2012) made an attempt to describe and analyze academic library websites in the years 2000 and 2010, as they appear both in the Internet Archive and in current library websites. A content analysis of 31 academic libraries homepages which were selected from the ACRL accredited LIS schools was conducted. Findings reveal that the content of academic library websites in the years 2000 and 2010 has much changed over the ten years, presenting an increasing use of e-journals and Web 2.0 applications, as well as a focus on library users, and a great use of graphics in websites. The comparison documented in the paper should prove very interesting and important to librarians, information scientists, LIS scholars and students, presenting trends, changes and innovations that have occurred within the scope of academic libraries over the last ten years. This study presents a yet unexplored dimension: the comparison, focusing especially on content, of academic library websites over a decade as they appear in the Internet Archive in 2000 and in the present library website in 2010.

Bravo (2012) conducted a study which aims to reveal the key elements of corporate identity through the information provided by entities' websites, and to study the differences in the information transmitted by entities through their websites. Design/methodology/approach – The research develops an analysis of corporate identity in Spanish banking institutions, focusing on the communication of identity elements through corporate websites. A content analysis methodology is employed. Findings – A total of 230 categories related to six dimensions of corporate identity were identified: visual identity, communication, culture, behavior, strategy and structure. The results show the elements most widely used by financial institutions and the moderating role of different dimensions (market scope, specialization, etc.). Research limitations/implications – A natural sequel of this work would involve the analysis of other sources of identity communication, and measurement of the corporate image transmitted to stakeholders. Practical implications – The results obtained will allow entities to compare themselves to others in the same
sector; likewise companies that are involved in mergers will be able to gain an understanding of the best way to build a new identity. Originality/value – Most literature on corporate identity is theoretical, with no empirical basis. This paper reveals empirically the elements of identity with a focus on banking institutions, and allows differences between entities to be established.

Soraya & Nooshinfard, (2012) conducted an evaluative study of central Universities of Iran from marketing view point. The website of each library is a window to that library on the one hand, and a guide for Internet users on the other hand. In fact, besides enjoying Internet facilities, libraries can in this way introduce them and offer services, or in other words, market their services. The purpose of this paper is to evaluate the status of 68 websites that belong to the central libraries at universities in Iran in order to identify the components used in the websites in terms of marketing. A check list has been used to gather data. It was developed through studying texts and seeking experts' viewpoint. The findings of the survey have been analyzed using SPSS software. Results show that the level of application of marketing components in the websites investigated is not high. The frequency of the applied components used at state universities is greater than at non-governmental universities. This study will help the librarians and website designers to increase the frequency of visits and fulfill clients' satisfaction via the introduction of the appropriate features of a good site. Additionally, guidelines regarding the efficient use of websites and offering high quality services will be mentioned.

Wickramanayake (2012) carried out a study with the intention of examining what type of instruction applications and help tools have been used to serve clientele via academic library websites and web pages, and how Sri Lankan academic libraries instruct and help users via their library websites and web pages. The results confirmed that the quality of academic library websites in Sri Lanka in providing online instruction and help was dependent on different variables. The development of above online services remains in its infancy. Most important instruction applications and help tools have not been
utilized by the majority of websites in academic libraries. Inaccessibility of such services via the library web reflects not only their malfunction in online instruction and help, but also onsite services of some areas in academic libraries. The deficiency of research on library websites in Sri Lanka provides no clear image regarding the existing situation of online library services. Thus this study contributes towards addressing this gap in the literature and features distinctiveness within the available literature.

Sarkar (2013) highlighted in his study on widget applications that, how academic libraries are harnessing widgets to make library resources easily and conveniently accessible to users. Examining the characteristic features, purposes of use and types of widget applications, the paper seeks to measure the degree of implementation of widget among academic libraries in different regions. A stratified sampling method was followed for selecting four samples of population, each representing one of the four continents (North America, Europe, Australia and Asia) and content analysis was used to collect data along the checkpoints. Giving a comparative account of widget implementation along the select dimensions, the study focused on relative acceptance of widgets among the continents and emphasized the areas where widget is being applied most. With examples, the study also illustrated the relevance of the different approaches taken by various libraries. The study was confined to selected libraries of higher education institutes among the four continents only. Libraries having non-English websites and restricted or limited access were no included. This unique investigation presented a comprehensive picture of widget implementation among the academic libraries across the world. The findings will serve as a valuable guide for future librarians who wish to incorporate such technologies in library websites. Furthermore, the checkpoints used here may serve as bedrock for framing questionnaire and interview schedule for conducting future research investigating users’ perception of this new web-based tool in order to comprehend fully the practicability and usefulness of widget.
Yazdi & Deshpande (2013) conducted an evaluative study of selected library association’s websites. Study reported in this paper evaluates 71 library association Websites using 15 selected Webometric criteria. The study uses Webometric analysis and ranking based on a scaling method and comparative means analysis (One Way ANOVA), and homogeneous subsets using criteria from SPSS13 and Excel2007. Findings of the study shows that the majority of library associations Websites have contact us links, but few have Frequently Answered Questions (FAQ) links. Library association Websites are categorized into three groups: high, medium and low, with significant differences between and within the three groups. A combination of criteria scores and classified groups shows that among the 15 criteria, only four criteria has no significant difference between the three groups and the classified groups are heterogeneous based on 11 criteria. Only 71 library association Websites were analyzed in this study. The paper provides a three category classification for library associations Websites.

3.2.3. Evaluation through users’ perception

Clyde (1996) carried out a content analysis of school and public and library web sites. The study begins with a brief discussion of the situation in one country, Iceland, based on a November 1995 questionnaire survey. Among other things, this Icelandic survey looked at library use of the Internet and the ways in which libraries are using the World Wide Web to provide information via a homepage. A larger Nordic study, of which this Icelandic study was part, sets the Icelandic findings in a broader context. To take this further into international setting content analyses were carried out of the home pages of public libraries and school libraries in 13 different countries. After a short description of the methodology, the results of these analyses are presented. Based on this, there is a discussion of the purposes for which a library might create a home page on the World Wide Web and of the information that might be provided through the homepage, depending on the purpose or aim. The
Helge (1999) presented the major findings from the project “Development of new methods for evaluation of library Web sites on the World Wide Web”. The report includes a brief examination and discussion of quality applied to Web sites in general and concerning library Web sites in particular. Findings from a few empirical surveys are presented. A new list of quality criteria for evaluation of academic libraries is compiled. The list is tested on three Danish academic libraries. Finally, a revised list of criteria is applied to twelve major Danish academic libraries. The findings include the panelists’ scores and their verbal comments. The main conclusion is that the Web sites of the Danish academic libraries in question are above average compared with Web sites in general. They do not, however, come up to expectations as virtual expressions of the quality levels of the libraries. This situation can only be improved if the libraries allocate the necessary resources regarding updating and development of the Web sites. This should be done on the basis of regular user studies and comparative evaluations.

Lease (1999) provided an overview of the concepts of usability, effectiveness, efficiency, and satisfaction, helping beginners to understand the process. Morgan explains that usability addresses the ability of the user to learn the product, experiment with it, and “even re-use it after periods of non-use.” He offers guidelines for testing the usability of the academic library systems.

Badi, Saqib & Balushi (2012) conducted a study to understand the 'user-friendliness' of a website as to what extent it is easy for all intended users to interact with website to perform their required task(s). Given the explosive growth in the use of computerized systems as well as the World Wide Web for delivering information and services, usability/accessibility becomes an important issue. The purpose of this research is to study the available literature on usability/accessibility ready websites and their tools and guidelines.
The research findings will help web engineers to build websites and web services accessible for all the target audience, including people with special needs. People with special needs meet barriers of all types, but computing technology is helping them to overcome these barriers. Accordingly, a great amount of development work has been carried out in the area of designing websites for disabled people, and it is increasingly becoming an important focus for a variety of reasons, legal (due to recent legislation in many countries promoting the rights of disabled people), economic, or ethical. Web engineers are increasingly aware that they need to ensure the usability of mainstream systems for disabled people by developing systems explicitly to meet the needs of disabled users (often referred to as assistive technologies), which also require evaluation to ensure their usability for the target audience. A descriptive/interpretive research method was used for the study of usability, accessibility, globalization, readability and culture differences based on related literatures and on previous studies by academics and industrial institutions.

Iqbal, Memoona & Waraich (2012) conducted a usability evaluation study for Punjab University Library (PUL) website, with a purpose of ascertaining the feelings of the website users along with identifying the efficiency of the system with reference to its goals and tasks. Study was processed through multi phases. At the beginning a comprehensive literature review was conducted mainly to understand theoretical and technical aspects of the study. In the second phase, data were collected through a questionnaire instrument that was developed by Oulanov and Pajarillo (2001). Data was collected from 300 respondents and was analyzed by using SPSS. The results of the study reveal that PUL website proves favorable in two out of five criteria particularly in terms of ‘affect’ and ‘efficiency’. The data show that affect and efficiency are more outcomes oriented than the technical aspects of ‘learnability’, ‘control’ and ‘helpfulness.’ The PU library was rated according to a variety of degrees, specifically ‘learnability’ and control which was rated
higher than ‘helpfulness.’ This is basically the performance measurement that focuses on the user and effect of this process on the users.

An evaluative study of 12 library websites was conducted 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 (Pareek & Gupta 2012).

3.2.4. Evaluation through web based tools

Stover & Zink (1996) developed an evaluation tool for the design of library home pages based on contemporary guidelines and evaluated home pages of 40 websites of American and Canadian Higher education libraries to assess their quality of web page design and to uncover trends, patterns and anomalies. This research addressed the problem that neither the design standards nor the automated evaluation tools meet Web designers’ requirements for ensuring that there are no accessibility barriers in their Web sites. Different tools arrive at different conclusions when assessing the same Web site for errors. Using Krippendorff’s Alpha Reliability Co-efficient (Kr-) as a measure of inter-reliability, the computer assisted content analysis tested data from 50 Websites. These findings support the argument that a human computer interaction approach should be pursued rather than relying on these tools exclusively.

A study conducted by Didegah & Erfanmanesh (2010) aims to assess Malaysian Public Universities’ Websites using the correspondence analysis method. Authors evaluated performance of these websites based on criteria obtained from Alexa databank. Study is based on six criteria: traffic rank, average number of pages viewed, time spent on the site per user, number of links received from other websites, and percentage of Malaysian and foreign
visitors. The universities’ websites were grouped based on their correlation and also their strengths and weaknesses. The current study is concerned with answering the following two research questions: (1) which universities’ websites fare better than others based on evaluation criteria? (2) Using correspondence analysis, determine groups in which Malaysian Universities can be categorized into and what are the attributes of each group? Research findings provide an evaluation of Malaysia Public universities’ websites status in terms of their functions and performance on the web. Although, all universities have not performed well in all criteria, each university has benefits and advantages. Website administrators should pay more attention to the services provided in order to increase user satisfaction. One way to do this is to introduce their websites to other sites on the web in order to gain more links. Connectivity plays an important role in recognizing websites in extended virtual environments. Another way to enhance website ranking is to provide services that attract international visitors.

Kothainayaki & Gopalakrishnan (2011) conducted a study on websites of Agricultural universities in India. Authors stated that university websites are increasingly used for a wide variety of purposes, such as uploading the prospectus, library catalogue; promote achievement of individuals, research groups, new publications, etc. Therefore, there is a necessity and desire to know about websites of academic organizations in general and Indian universities in particular. This paper aims to evaluate Agricultural Universities in India through webometrics method. A total of 54 Agricultural Universities were considered, which includes 44 State Agricultural Universities (SAUs), 1 Central University, 5 Deemed Universities, and 4 Central Universities with agriculture faculty. Various concepts like Google Page Rank, Alexa Traffic Rank, and rich files are considered for evaluation. It also presents the network diagrams showing the link structures between the web nodes in webometric analysis.
Mahmood & Richardson (2011) conducted a survey of the web sites of the academic libraries of the Association of Research Libraries (ARL-USA) regarding the adoption of Web 2.0 technologies. The websites of 100 member academic libraries of the Association of Research Libraries (USA) were surveyed. It was found from the study that all libraries were using various tools of Web 2.0. Blogs, micro blogs, RSS, instant messaging, social networking sites, mashups, podcasts, and podcasts were widely adopted, while wikis, photo sharing, presentation sharing, virtual worlds, customized webpage and vertical search engines were used less. Libraries were using these tools for sharing news, marketing their services, providing information literacy instruction, providing information about print and digital resources, and soliciting feedback of users. The paper is useful for future planning of Web 2.0 use in academic libraries.

Zaphiris & Ellis (2011) investigate whether the websites of the top USA universities are ranked high in terms of accessibility and usability and if these two measures are correlated. The usability and accessibility of the top fifty USA universities were measured using two automatic evaluation tools: Bobby and LIFT. The results show a low compliance (30%) with Web site Content Accessibility Guide and a low usability rating for most of the university websites. The accessibility approval was found to correlate significantly with overall usability ratings of the websites. The size (in Kb) of the website was found to be a driving variable both for usability and accessibility.

Davis (2012) made an attempt to determine the percentage of reference errors and type of errors in four library and information science (LIS) journals. The references were compared to online freely available tables of contents. The errors identified were categorised into six elements: journal title; author(s); article title; publication year; volume; and page numbers. The highest percentage of reference errors was 49.1 percent (Information and Management). The overall error rates were: author (56 percent), page number (22 percent), article title (15 percent), volume (3 percent), publication year (2
percent) and journal title (2 percent). Error rates in these LIS journals are considerable. The current method of authors being responsible for the references is not resulting in accurate bibliographic information.

Billingham (2014) explains his paper how Edith Cowan University (ECU) Library improved the accessibility of their web site, aiming for Web Content Accessibility Guidelines (WCAG) version 2.0 Level AA. It describes the results obtained. It was found that ECU Library web site failed WCAG 2.0 Level A standard in the initial testing and re-testing. Many individual pages which failed initially passed the re-test. The smallest improvement was seen in suppliers’ web sites. Results of the paper could help libraries to improve web site accessibility, as it covers negotiating with suppliers to upgrade their web sites, plus upgrading editable webpages. It shows initial and re-tests results, allowing libraries to compare their results to those of ECU. Legislation and guidelines state web sites should be accessible to all users and organizations providing non-accessible web sites risk being used.

Kamoun & Almourad (2014) conducted a study to examine the extent to which accessibility is taken into account in the assessment and ranking of e-government web sites through the lens of a specific study related to Dubai e-government. The paper considers a case study related to Dubai e-government and it evaluates the accessibility of each of the 21 Dubai e-government web sites, based on the Web Content Accessibility Guidelines (WCAG) 2.0 and using an automated accessibility testing tool. A bivariate correlation analysis is performed to assess the correlation between web site ranking and accessibility score. The research reveals that contrary to common intuition and some earlier studies, there is a weak correlation between e-government web site ranking score and web site accessibility.

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. Patient education materials provided on Indian Diabetic Association website written at recommended reading grade levels and ensure Readable and Comprehensible to their audience.

3.2.5. Website evaluation models

An article by Houghton (2000) describes the design and implementation process for developing an academic library website at De Montfort University (DMU) and gives practical guidance and advice. Aim of the website is to provide access to quality information services for students and staff at a large decentralized university. Article discusses resources and subject areas that are specific to DMU’s teaching and learning environment. However it aims, where possible, to give generalized advice to any academic library that is considering building a website in the hope that others will benefit from the DMU experience.

Fink & Dieter (2001) made an attempt to evaluate websites using WebQual and developed model for design and evaluation of the websites. In this study Web site effectiveness was measured in terms of information and service quality. The former is important because of the key purpose of a Web site to provide up-to-date information and was captured by the WEBQUAL instrument. For the latter, the well accepted SERVQUAL instrument was available and applied. The study, which examined the usefulness of the Web site to the university’s library staff, confirmed the distinctiveness of information and service quality as measures of Web site effectiveness. Specific findings indicated that the greatest differences between subjects’ expectations and perceptions were for service quality rather than information quality items.
Furthermore, the gap was significantly higher for those employees who had worked in the library the longest. As Web sites become ubiquitous the desire to establish their effectiveness will increase and hence the demand for suitable measurement approaches and metrics.

Chao (2002) developed and tested an instrument for evaluating the quality of academic libraries on the World Wide Web (Libweb). By consulting authoritative criteria used for traditional print resources and Internet/Web resources, a set of 68 essential indicators was generated and later reorganized and reduced to 16 criteria through factor analysis. After a survey of library experts, the instrument's reliability was verified by analysis of variance. Furthermore, a regression model considering both the respondents' demographics and the quality criteria was applied to identify 11 significant factors, which were later reduced to eight factors. These eight factors represent the most salient and non redundant criteria. Two instrument forms are suggested for prospective users to evaluate academic Libweb quality and to construct and maintain a good site.

Letnikova (2003) stated in his study that, librarians conducted early studies on academic library Web sites, which was based on the works of the first professional usability experts, such as Jakob Nielsen, Jeffrey Rubin, and Jared M. Spool. Although extremely useful in the general sense, these sources are not library-specific. Recently, there has been an emergence of publications that focus on the usability testing of the academic library Web site. The need for a usable and intuitive library Web site arose from the fact that the majority of the libraries Web sites were initially designed from librarians’ perspectives without any customer centered activities. At the same time, the rapidly expanding online retail market forced large commercial organizations to conduct usability analysis of their Web sites in an effort to attract more business by enabling customers to find their products and services naturally. Information has become as much of a commodity as other products and services. Commercial search engines compete with libraries by offering the
student an easy way to find information. In an answer to this, the call has been made for library Web sites that can provide students and faculty with easy access to holdings and services. Following the business model, librarians started to implement extensive user studies applying methods and techniques developed by professional Web designers.

Web design guidelines suggested by Burke (2005) proved effective throughout the commercial sector, could be adapted for library homepage design. Acceptance of industry standards for homepage usability, specifically Nielsen and Tahir’s criteria, would give library users recognizable features and increase their confidence and comfort levels when using library websites. The paper aims to present a comparison of library homepages with these criteria to provide an assessment of how libraries fare in comparison with the commercial sector. Little research has been undertaken to evaluate the appeal and efficacy of homepages of libraries associated with medium-sized universities, which have different audiences than do larger universities. The dataset of 80 academic libraries associated with medium-sized universities (8,000-13,000 students) was compiled with data from the National Center for Education Statistics and Peterson’s College Bound. Data on 14 variables derived from Nielsen and Tahir were examined on these 80 library homepages. Variables are grouped into four categories: search, navigation, design, and general features. Based on Nielsen and Tahir’s criteria, library homepages fared well in comparison to business homepages. Statistical analysis of the findings revealed that library homepage designs were significantly different from businesses for only four variables: the ability to search the website, the use of a search box or a link, the use of animation, and a change of link colors to indicate viewed links. A greater amount of business homepages used a search box as opposed to a search link. Fewer libraries facilitated navigation by creating links that changed color after use. Library homepages generally had fast download times, and avoided animations and automatic music. A comprehensive review of all of Nielsen and Tahir’s design characteristics for homepage usability cannot be
fully considered in a study of this size. Information-seeking behaviors of college students and internet users within this age range suggest that design conventions established on the web and tested by usability experts may provide a framework for effective library homepage design.

Ting, Yang, & Chan (2008) conducted a study with an intention of developing a set of evaluation criteria for English learning websites. These criteria can assist English teachers/web designers in designing effective websites for their English courses and can also guide English learners in screening for appropriate and reliable websites to use in increasing their English ability. To fulfill the said objective, three-phase research procedure was employed: (a) establishing a preliminary set of criteria from a thorough review of the literature, (b) evaluating and refining the preliminary criteria by conducting interviews with in-service teachers and learners, and (c) validating and finalizing the criteria according to expert validity surveys. The established criteria have 46 items, classified into 6 categories (the number of items within the category) – general information (12), integrated English learning (13), listening (4), speaking (6), reading (5), and writing (6). The general information evaluates the authority, accuracy, and format of the learning websites. The integrated English learning evaluates the overall information relevant to English learning materials as well as the common features of the four language skills. The criteria for listening, speaking, reading, and writing, for example, examine the suitable intonation, skills of discourse, classification of reading articles by their attributes, and the proper use of discussion boards for students when practicing their writing skills. Based on qualitative and quantitative analysis of the interviews and expert validity surveys, we confirmed the effectiveness of the developed evaluation criteria with satisfactory indexes of inter-rater reliability, content validity, and factorial validity.

WebQual is a method for assessing the quality of Web sites. The method has been developed iteratively through application in various domains,
including Internet bookstores and Internet auction sites. In this paper we report on the application of a new version of WebQual to Internet bookstores: Amazon, BOL, and the Internet Bookshop. WebQual draws on previous work in three areas: Web site usability, information quality, and service interaction quality to provide a rounded framework for assessing e-commerce offerings. Although WebQual is grounded in the subjective impressions of Web site users, the data collected lends itself to quantitative analysis and the production of e-commerce metrics such as the WebQual Index. The reliability of the instrument is examined and core constructs of Web site quality identified using factor analysis. The role of WebQual in assessing an organization’s e-commerce capability is discussed (Barnes & Vidgen, 2011).

Joo, Lin & Lu (2011) developed a usability evaluation model and associated survey tool in the context of academic libraries. This study not only proposed a usability evaluation model but also a practical survey tool tailored to academic library websites. A usability evaluation model has been developed for academic library websites based on literature review and expert consultation. Then, the authors verified the reliability and validity of the usability evaluation model empirically using the survey data from actual users. Statistical analysis such as, descriptive statistics, internal consistency test, and a factor analysis were applied to ensure both the reliability and validity of the usability evaluation tool. From the document analysis and expert consultation, this study identified eighteen measurement items to survey the three constructs of the usability, effectiveness, efficiency, and learnability, in academic library websites. The evaluation tool was then validated with regard to data distribution, reliability, and validity. The empirical examination based on 147 actual user responses proved the survey evaluation tool suggested herein is acceptable in assessing academic library website usability. This research is one of the few studies to engender a practical survey tool in evaluating library website usability. The usability model and corresponding survey tool would be
useful for librarians and library administrators in academic libraries who plan to conduct a usability evaluation involving large sample.

Stockdale and Borovicka (2011) developed a website evaluation instrument that is flexible enough to serve a variety of e-tourism players. The instrument is developed from quality dimensions derived from an existing IS e-commerce success model. It was tested against typical tourism websites and showed that it can support travel players in the identification of website quality.

A study by Manzoor & Hussain (2012) was 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. The evaluation analysis shows that the academic websites are partly usable in their informational structure, navigation and also weak in accessibility. The evaluation shows a detailed structural description of what needs to be improved in these websites to enhance their usability. The proposed WUEM helps in an effective and easy evaluation of websites by the web developers. The research will help academic web developers to enhance the usability of their websites by considering such simple features listed in WUEM.

Content, usability and aesthetics are core constructs in users’ perception and evaluation of websites, but little is known about their interplay in different use phases. In a first study, web users stated content as most relevant, followed by usability and aesthetics. In Study 2, tests with four websites were performed and resulting data were modelled in path analyses. In this model, aesthetics had the largest influence on first impressions, while all three constructs had an
impact on first and overall impressions. However, it was found that only content contributed significantly to the intention to revisit or recommend a website. Using data from a third study we were able to replicate this model. As before, perceived aesthetics and usability affected first and overall impressions, while content perception was important for all analyzed website use phases. In addition, aesthetics also had a small but significant impact on the participants’ intentions to revisit or recommend a website (Thielsch, Blotenberg & Jaron, 2014).

Wijayaratne & Singh (2015) conducted a study to introduce a library website model. Further, the paper discusses a designer’s checklist and an evaluative instrument that was constructed based on the proposed model. The model was developed through a Delphi study that was participated by two panels of experts. The researcher communicated with the panel members via e-mail using two Delphi instruments designed out of two item pools that were developed based on the knowledge gained from surveying the literature, visiting the selected libraries and exploring the library websites. Then, a designer’s checklist and an evaluative instrument were derived from the proposed model through a series of brainstorming sessions. The proposed model consisted of altogether 140 items (60 web content elements and 80 web design features). The designer’s checklist comprises all 140 items, and the evaluative instrument comprises 60 content elements and 57 design features. This study has developed an academic library website model and derived two instruments based on the proposed model. Further studies are needed to customize, particularly, the web content pillar of this conceptual model, to meet the specific needs of different types of libraries including public libraries, special libraries, school libraries, etc.

The literature was selected for review purpose taking into account the wide spectrum of website evaluation criteria viz. homepage features, quality of the presentation, navigation features, links used, user assistance, methods, and techniques including models for evaluation, and user’s perception studies. Most
of the papers deal with the features from various angles viz. Comparison in terms of similarities and differences for query formulation, results manipulation, help options etc, highlighting problems of terminology and consistency, and missing information, usability testing leading to unexpected search behavior particularly in the context of access to e-resources etc. Literature also shows that no standard practice and guidelines of contents at informative level is followed.
References:


• Wijayaratne, A L., & Singh, Daljit. (2015). Developing an academic library website model, a designer’s checklist, and an evaluative

