Chapter 2
Review of Literature
CHAPTER – 2

REVIEW OF LITERATURE

2.1 INTRODUCTION

Review of literature is one of the important aspects of research. Generally, literature study is conducted in order to understand what work has been done in the given field, to identify the various aspects of study until now not touched by other researchers, and to find any suitable method of conducting research, if possible. A review of literature not only provides glimpses into the earlier studies carried out in this particular area, but also reflects the direction in which it is moving. It is with this background the investigator has made an attempt in this chapter to present such of the important studies carried out on the topics like digital library concepts, digital library initiatives in India, digital preservation, digital library software, Metadata etc. The studies presented in this chapter can not be construed total and comprehensive. The researcher within the limitations has made an attempt to present selected studies here, for which the literature reviewed has been categorized under the following headings:

- Digital Library Concepts
- Digital Library Initiatives in Other Countries (International)
- Digital Library Initiatives in India
- Digital Library Collection Management
- Institutional Repositories (IR) and (OAI)
- Digital Library Software
- Digital Library Usability and Evaluation
- Studies on Digital Preservation
- Metadata and Other Standards
- Copyright and Intellectual Property Rights (IPR)
2.2. DIGITAL LIBRARY CONCEPTS

Anunobi (2011) has presented one of the ways in which digital library technology is employed in providing twenty-first century library and information services to a university community in a developing country, together with the challenges and prospects of such an application. This work analyses documents using content analysis of documents in library archives, interviews with library stakeholders and assessment of the structures, facilities and technologies as deployed in the Digital Library housing the information that is necessary for academic work. This paper provides librarians with an insight into how developing countries understand and apply digital technology to library operations and services. It also provides other libraries and related institutions with an opportunity to learn from a concrete experience.

Agnes (2010) identifies the relationships between the importance of digital library evaluation criteria and present evaluation of digital libraries in Romania.

Using digital library applications as teaching tools Pomerantz, Jeffrey (2009) provide a valuable learning experience for students, and may provide useful feedback to the developers of DL applications. This paper identifies and explores DL concepts that may most effectively be taught using DL applications, in the context of project-based DL courses.

Krishnamoorthy (2009) had described the digital resources and digital library initiatives of the Tamilnadu Dr.M.G.R.Medical University; they had discussed in brief about the e-resources available in that university and had explained methods of digitization of previous examination question papers of under graduate and post graduate courses of medicine.

Krishnamurthy (2008) describes the open access and open source movement in the digital library world. A review of key developments in the open access and open source
movement is provided. This paper provides useful information about software for institutions introducing digital library concepts.

Mahesh (2008)⁶ had made a review of Indian and foreign periodicals literature published on digital libraries in India, which would be useful to access and understand the state of digital library research and development in India, and their study reveals that most articles focus on digitization efforts and collection building, thereby developing digital libraries and digital collections. There are very few articles on copyright issues and management of digital libraries. Various issues such as digital rights management, security and policies have not been touched.

Building on a comprehensive case study at the National Library in Norway, Bygstad et al (2008)⁷ had presented a socio-technical point of view for the impact of semantic web technology on the strategic, organizational and technical levels; their findings indicated that the highest impact was at the organizational level. They have pointed out the reason behind, which was due to poor establishment of inter-organizational and cross-organization structures. In addition, they had suggested development framework for ontology engineering in digital libraries must be examined.

Kaushik (2007)⁸ presents the different aspects of digital library including ongoing projects, also includes the current status and future directions in digital library research.

Chaurasia (2006)⁹ had highlighted in his article, the need for digitization and had discussed about the determination of library materials to be digitized and some of the library collection which are not to be digitized.

Ansari (2006)¹⁰ describes the concept of digital library and virtual library. It also explores the characteristics and functions of digital library. Technology that led to build a digital library is also discussed as human aspect.
Riazuddin (2004) focuses on digital libraries. Libraries are the instruments of liberating individuals and developing well informed societies have a history of 153 years. It helps a vital swing in higher education from teaching and learning. The most significant shift in building digital collections is greater inter operability among information systems across the country and internationally. With the technology available at an affordable cost, the libraries are initiating small digitization projects as individual library or as a group of libraries. Building up digital collection and infrastructure required to access them is a challenge that every library has to deal with.

Frumkin (2004) discusses the concept of the digital library and the importance of being involved in the development of the digital library as it evolves.

Devika (2003) presents the trends in digital library developments and describes the major initiatives. An overview of the digital library projects emphasizing the popularity and combine digital library work globally, and the trends in digital library research were highlighted.

Scotland with its Parliament recently re-established after 300 years, is likely to see the development of a networked service to make electronic information, learning and research materials readily available to all of its citizens as a key aim in the early part of the twenty-first century. The newly created Centre for Digital Library Research (http://bubl.ac.uk/cdlr) at Strathclyde University (http://www.strath.ac.uk) in Glasgow, aims to be a significant player in the process of making the vision a reality, narrates Nicholson (2000). Bringing the networked service of the future into being requires collaborative research and development effort in a range of areas. These areas range from identifying and documenting current problems and establishing future requirements, to work on major elements of the problem such as user needs and user interfaces, collaborative collection development, content creation and maintenance, interoperability problems, navigation and integration issues, access control, metadata, and standards and policy frameworks. Examples of some of the research and development projects undertaken to achieve these goals include: GDL (Glasgow Digital Library Project); CVU
(Clyde Virtual University Project); CAIRNS (Cooperative Academic Information Retrieval Network for Scotland); SCONE (Scottish Collections Network Extension Project) and DIO (Digital Information Office Project).

An approach to infrastructures for the digital libraries has been outlined by Indigo (2000)\textsuperscript{15}. It fulfils two crucial requirements to digital libraries, namely scalability and the ability to handle newly evolving document types based on a classification of digital library architectures.

Meyyappan (2000)\textsuperscript{16} have reviewed the current status of twenty digital libraries around the world: twelve from the US, three from the UK, two from Australia, one from New Zealand, one from Singapore, and one from Canada. Various features of these selected digital libraries were collected from their home pages, journal articles and the information published on the Web. The parameters used to study the chosen digital libraries include: contents, type of library organization, user interface, access, information retrieval, search features, output format, and links to other Internet resources.

Hattery (1999)\textsuperscript{17} described a number of freeware library automation projects such as: Open Source Digital Library Systems, OSS4 Library (open source system for libraries), Thommo's Scripts, and other recent project and listed the relevant Web sites and list of article references.

Chowdury (1999)\textsuperscript{18} provide the definitions and characteristics of digital libraries as proposed by various researchers and provides brief account of some major digital library projects that are currently in progress, or are just completed, in different parts of the world. They also present a review of digital library research under 16 major headings. The review indicates that much has been learned through digital library research within a short span of time. However, a number of issues are yet to be resolved. They further indicate the research issues that need to be addressed and resolved in order to bring the digital library from the researcher's laboratory to the real life environment.
Hardy (1996)\textsuperscript{19} describes the benefits of a low-cost digital library server using an electronic mail interface. Further, outlines a hypothetical budget and cost analysis for the initial and possible upgrade path. The reasons for preferring the Linux adaptation of Unix for the platform for this application has also been elaborated.

Saffady (1995)\textsuperscript{20} considers the application of digital library concepts and technologies for the management of library collections. Definition of a digital library; Functions of text storage and retrieval programs; Components of electronic document imaging systems and advantages of digital libraries.

2.3. DIGITAL LIBRARY INITIATIVES IN OTHER COUNTRIES (INTERNATIONAL)

According to Aguilar (2011)\textsuperscript{21} academic libraries have seen a dramatic decline in face-to-face traditional reference desk interactions over the past decade. Due to new initiatives at the University of New Mexico, reference services are flourishing even though traditional desk reference interactions are declining. Incorporating more engaged librarians within the academic and surrounding communities has expanded reference services and created new opportunities for librarians to consult with users in multiple settings.

Hunter (2010)\textsuperscript{22} states that building on experiences from earlier digital initiatives and partnerships, the University of Virginia has developed new services and forged new collaborations between traditional information technology and library units in support of changing approaches to science and engineering research and education.

Khan (2010)\textsuperscript{23} suggests various initiatives for PLA including promoting the importance and relevance of libraries in the digital age, provision of information tools and on-the-job continuing education, cultivation of information society, discussion groups, leadership development, formulation of professional standards and peace promotion in the society.
Takle (2009) describes the National Library of Norway and its process of establishing digital national library and the services. The author discusses the agreements on the digital deposit of certain newspapers, books from some publishers.

Green (2009) describes the British Library Digital Library programme, its goals, priorities for the programme, mechanisms for providing access to digital materials, and its efforts in accessing the digital contents through digital libraries.

Yao (2009) studied the Chinese Digital Library construction and the importance of sharing its resources with other libraries. For that, the authors selected ten universities and their library web sites, five public libraries and one science library were selected for comparison and analysis focusing on the content set-up, digital resources, navigation systems, mainstream modes, found some defects in term unification, user instruction training programs. The authors found some defects in term ‘unification’ on home pages, unified retrieval platform selection among various databases, and navigation system construction among the Chinese digital libraries.

Wichada (2008) aims to provide information about various digital initiatives in libraries in Thailand and especially the use of Dublin Core metadata in cataloguing digitized objects in academic and government digital databases. The author continues to monitor the development of digital initiatives and has identified several new digital initiatives created by academic institutions since 2003. A major copyright issue in Thailand, the ineffective enforcement of intellectual property laws relating to access rights, is presented. Also discussed is the significant obstacle to record retrieval created by the structure and complexity of the Thai language.

Han (2007) describe an Afghanistan Digital Library Initiative of building an Integrated Library System (ILS) for Afghanistan universities and colleges based on open source software. The authors applied system analysis approach to evaluate different open source digital library softwares, and its customization options available related to Afghanistan perspective.
Rosenberg (2006) studied the university libraries in Africa and their progress towards establishing digital library services at very different speeds and levels. The author found that in majority of libraries e-resources are available but facilities are very poor to access the resources. The author concludes that lack of funding and lack of retention of trained staff are the key challenges in African related to digital libraries.

The mode of setting a hybrid library (digital and manual) at the KEMRI / Wellcome Trust Research Laboratory (KEMRI / WTRL) Centre based in a rural district along the Kenyan coast was described by Kaduda et al. (2005). The research activity at the Centre has focused on malaria and a number of clinical, laboratory and community-based research projects.

The digital divide both in UK and the USA was examined by Hull (2003). The adequacy of government initiatives to overcome electronic disadvantages was considered in this study. The digital divide is considered in the light of social class, gender and age. Although libraries are unlikely to be able to rectify entirely the effects of material disadvantage, it is clear that they can play a key compensatory role.

Gatenby (2002) focused on the role of the National Library of Australia ensuring that significant Australian resources in online form are collected, archived and made available for use in the long-term. Further also discussed some issues that are of particular relevance to current users, for ensuring sustainable access to digital resources and to protect these resources from sudden loss by placing them in a safe place as a digital archive.

Flex (2001) reviewed the existing African theses and dissertation projects, including the Database of African Theses and Dissertations (DATAD) and the African Universities.
While describing the delineating recent developments of digital libraries in Taiwan, Hwang (2000) present a few digital library programs in Taiwan. The digital library problems were discussed in four different categories such as preservation of Chinese and Taiwanese culture, establishment of domestic research digital libraries, provision of foreign research digital libraries and integration of conventional and digital libraries.

David (2000) presents an overview of digital library initiatives throughout Europe as of November 2000. Outline of the European Commission's (EC) Telematics for Libraries Program, details of the International Biblioteca Universalis Project, which aims to build a multimedia collection of the world's scientific and cultural heritage; features of the national digital library initiatives of individual European countries, including France, Germany, Russia, Denmark, Finland, are discussed.

Thomas (1999) undertaken a Delphi study on digital libraries in January 1998 to gain a broader understanding of issues related to digital libraries. Selected experts in the field were identified and presented with a series of 118 opinion statements, organised over a set of 13 questions. The Delphi Planning System, a Web-based software application, was utilized initially. Originally, 218 experts were considered and 33 were invited to participate in the Delphi study. Results from expert consensus included that: (1) efforts associated with the development of digital libraries are primarily collaborative, (2) an array of expertise is involved in the research and development of digital library, (3) a digital library has the potential to transform access to digital knowledge records and (4) the primary role of librarians in Digital Library development is an extension of current practice.

Harter (1997) considers a range of definitions for a digital library from the perspective of scholarly communication and the properties of a traditional research library. The study explores some of the problems and issues involved in creating and maintaining a digital library, depending on the characteristics one wants it to have and stresses the need to consider the requirements for the digital libraries of the future.
Kluiters (1997) discussed the contributions of the first "live" experiences on organizational, operational, and technological levels in building digital journal collections at participating libraries in a commercial environment. It represents a true state-of-the art in operational experiences with respect to electronic primary journal information available to end users via their own digital library.

2.4. DIGITAL LIBRARY INITIATIVES IN INDIA

Anupkumar (2011) critically examines the evolution of open education resources (OER) initiatives in India. This article analysis impact of OER on Indian systems of education, ranging from lifelong learning, technical and vocational education and training to higher education systems.

Chakraborty (2011) introduces merits of open Access resources especially in Indian scenario. This article includes providers of open study materials like eGyankosh by IGNOU, eGurukul etc. This paper also discusses open archiving resources in Indian Institute of Astrophysics, IIT-Allahabad, IIT-Delhi, and ISI -Bangalore. The major Indian government initiative called 'Digital Library of India' has been explored. One important resource LIS studies namely, Library (LDL) at Documentation Research and Training Center (DRTC) has also been covered.

Swain (2010) in their article discusses the outlook for the acceptance of electronic theses and dissertations (ETDs) as primary sources of information and types of research and communication. Discussion topics include a brief history of ETDs, the challenges associated with implementing ETDs collection projects in academic libraries, and ETDs initiatives in India's digital libraries. Brief information is given about related research in Korea and the United States. The usefulness of ETDs and the archival, legal and policy issues related to ETDs projects are discussed.
Walmiki et al (2010)\textsuperscript{42} had made an questionnaire based survey, on awareness and use of UGC-INFONET digital library consortium by the faculty members of Karnataka state university and found that 39.79\% of the faculty members are aware of and use of the UGC-INFONET digital library consortium resources, where as 35.99\% are aware, but do not use and 24.22\% are not at all aware of the availability of the consortium resources. The author suggests that lack of knowledge to use, insufficient internet nodes, slow bandwidth and lack of relevant information sources are found to be major problems faced.

Ghosh (2009)\textsuperscript{43} examine the developments in Electronic Thesis Dissertation (ETD) repositories in particular with PhD thesis repositories in India. The author state studies of ETD repositories in academic sector and discusses the subject coverage, number of items, access policy, browse/search option, and value added services. The author recommended submitting the PhD thesis in electronic form since most of thesis are being produced electronically using word processing packages. The author found a few national level institutes such as the Indian Institute of Science and the Indian Institute of Technologies have established ETD repositories. The author proposes the construction of a reservoir of extensive doctoral research portal in India.

Mittal (2008)\textsuperscript{44} discussed the state of digital libraries and repositories in India which are available in the public domain. The authors found that most of the digital libraries and repositories were using open source software, particularly Dspace and Eprint and the document format used in the digital library is PDF (Portable Document Format). The authors also gave a comprehensive list of digital libraries and institutional repositories in India available in public domain.

Sujatha (2008)\textsuperscript{45} presents a powerpoint presentation on digital library initiatives in India, which was delivered during the 29th International Association of Technological University Libraries (IATUL) Conference 2008 at the Auckland University of Technology (AUT) in New Zealand on April 21-24, 2008. It aims to propose a digital library initiative for the open distance learning (ODL) institutions in India. It examines
the county's digital library initiatives and addresses the problems that they have encountered such as the national policy, the new technological advancements, and the lack of skilled personnel who will manage the library.

Bansode (2008) has emphasized on some of the important projects at International level and at India, from the perspective of open access to scholarly literature. According to them, digital libraries like traditional one, select, acquire, catalogue, classify and disseminate information and knowledge, and they state that traditional concept of collection must be revised to accommodate materials that are accessible electronically.

Arora (2008) describes the digital library initiative of University Grant Commission of India in setting up the Infonet Digital Library Consortium (The Information and Library Network) in order to provide access to scholarly communication to the academic community in India. The usage trends of e-resources from various publishers during 2004-2007 are detailed. The study provides evidence of increased use of consortia services for access to e-resources in Indian Higher Education.

Varatharajan (2007) discusses the digital library initiative efforts by the higher education and research institutions in India. The authors have found that almost all the digital libraries are using the open sources digital library/repository softwares.

According to Ghosh (2007) Open access facilitates the availability and distribution of scholarly communication freely, as a means and effort to solve the problem of inaccessibility, primarily due to financial constraints, particularly in the developing countries. The author states that in India there has been a gradual realization of the usefulness of open access among various institutions. Various open access initiatives have been undertaken and are operational, many are in the developmental stage, some initiatives have also been taken in the area of metadata harvesting services particularly public funded ones. The author further conveys that the future of open access in India is dependent upon a proper policy and developing a proper framework.
Jain (2006)\textsuperscript{50} has outlined the guidelines and software packages for digitization and an overview of digitization projects in India.

Bharat Kumar (2006)\textsuperscript{51} has made an attempt to explore the objectives and policies of INDEST Consortium in Academic Libraries of India. He has explained about type of electronic resources subscribed by the consortium, incorporation of digital version of works for ACM digital library and had included intranet version of Indian standards on hard Disc or CD-ROM offered through INDEST Consortium.

Sinha (2006)\textsuperscript{52} presents an overview of the latest development, that has been taken place in the area of digital library. A brief account of Indian Initiatives for establishing digital libraries and with efforts taken by university/institutional libraries to transform themselves from the traditional libraries to computerised and ultimately digital or hybrid libraries also discussed. In addition to these, some initiatives taken in North Eastern States of India for the digitization of manuscripts and rare materials preservation of digital content etc have also been narrated.

Sreekumar (2006)\textsuperscript{53} has presented a case study of developing digital library of audio/video resources using Greenstone software at the Indian Institute of Management (IIM) Kozhikode.

Vinayagamoorthy (2006)\textsuperscript{54} traced the current development towards the creation of digital libraries in Engineering and Technology. For this purpose, a sample survey of major engineering educational institutions in Tamil Nadu have been conducted to measure the extent of ICT applications and to assess the digital collection development and the digital preservation and digitization activities. It also deals with the current status of the digital library initiatives. Analyses the problems faced by the librarian towards the digital library initiatives.
Jain (2006) describes the digital library initiatives in India with examples of the Government of India. Initiatives at National level Institutions and at academic institutions of national importance towards digital activities and the policies in India towards digital library development are discussed.

According to Koganuramath (2005) digital libraries are the systems providing users with the organised information access to repository of information and services at knowledge base. The major objectives and principles of digital library have been narrated with applied knowledge system at Tata Institute of Social Science (TISS) library. The functional components of the Digital Library have also been presented by him as a model for the information services of the library.

Sreekumar (2005) found that the motivational and emotional bonding among the stakeholders are melting down eventually as the digital library development process gets fired up. There are a host of problems the enthusiastic library fraternity face in their digital library development endeavours starting from copyright issues, technology complexities, infrastructure threats, diverse publishers, stringent policies and monopolies. The authors shared experience in creating a state-of-art digital library information system, by seamlessly integrating and aggregating the print as well as the diverse and distributed digital content, for Indian Institute of Management (IIM), Kozhikode.

Bhattacharya (2004) focuses on the digital library initiatives in India with examples, the initiatives of the government of India and state governments towards digital library activities, and the policy of the Government of India towards digital library development. The current initiatives, such as the INDEST Consortia, are described in detail. The challenges facing digital libraries, the problems being encountered while developing digital libraries, the problems of the digital divide facing the country are mentioned.

Gulati (2004) discusses the status of information and communication technologies usage in Indian libraries with special reference to special libraries and the efforts made by various institutions to propagate e-information products and services. This paper highlights the consortia efforts in India like JCCC Consortium, INDEST Consortium,
CSIR E-journal Consortia, and UGC Infonet. It further discusses digitisation efforts in India at NISCAIR, New Delhi, IIIMT, Kerala, C-DAC Pune, and the Digital Library of India. In addition it incorporates details on major information systems in India (such as NISSAT) and major library networks in India (such as INFLIBNET, DELNET, CALIBNET etc.). The paper concludes with challenges for library and information science professionals and an overview of initiatives taken by Government of India.

2.5. DIGITAL LIBRARY COLLECTION MANAGEMENT

Mohsenzadeh (2011) in their research contribute to existing knowledge in the areas of information technology and digital library management, especially in academic arenas. The paper helps librarians do their best in the new environments.

According to Scarletto (2011) collection usefulness can be analyzed through reference questions when circulation data is not available. Many levels of collection management are used for the study's results, from standard collection building to de-accessioning to digitization priorities.

Horava (2011) discusses collection management at libraries during the digital age, particularly in the area of environmental sustainability. A definition of sustainability is included, particularly how this concept could relate to academic libraries.

Morrisey (2010) aims to address Data-Driven Decision Making in Electronic Collection Development so as to give the reader a sense of direction in how these data can be applied to drive collections and collection-development policy.

Prochaska (2009) discusses digital special collections in libraries and making these available on the Internet for researchers. The author states that special collections have become the center of most libraries and that librarian must focus on preservation, reformatting, and security. The article mentions potential complications including scarce resources, legal issues, and organizational boundaries. The article also discusses the future of special collections, the scope of digitization in research libraries, and digital curation.
Cervone (2009) defines and describes Pareto analysis as a method for identifying and addressing the factors that have the most impact in a digital library project's success. Pareto analysis is useful to project manager and project teams alike as a means for identifying, prioritizing and addressing the factors that have the most impact in a digital library project. It is particularly useful to a web redesign team as a mechanism for prioritizing changes and improvements that need to be made to a web site. The author fills a gap in the digital library project management literature by providing an overview of a useful tool in identifying and prioritizing the steps and factors in a project contribute to its success.

Daines (2009) discusses how the INDI (The Integrated Digital Special Collections) Project enabled the successful implementation of process for managing large technology projects in a Harold B. Lee Library at Brigham Young University. It highlights how the scope of these technology projects is set and how the major deliverables for each project are defined. The article also talks about how the INDI Project followed the process and still failed to be completed. It further underscores the importance of project management in archival management systems.

McGuigan (2008) discusses the trend of collection management of electronic journals in academic libraries in Great Britain. The article explains how the research library transformed from journal content middleman into the role of publisher. It notes that the major developments facing collection management of journals in academic and special libraries concern change.

Williams (2008) describe initial findings of the AHRC-funded Digital Lives Research Project studying personal digital collections and their relationship with research repositories such as the British Library. The research reported in this article, forms part of a longer term study, Digital Lives: research collections for the 21st century, takes a wide look at personal digital document acquisition, collection, creation, organization, retrieval, disposal, considering all applications and formats.
Mishra et al (2008)\textsuperscript{69} describes the processes involved in managing the CD-ROM collection at P.K.Kelkar Library. The paper discusses the importance of CD-ROM in relation to de-stressing library collection. It outlines the planning and processes involved in organizing CD-ROM collection on shelves and development of a user interface through open-source software.

Columbia University Libraries has developed the Archival collections Portal, a unified search system helping users discover archival resources in a streamlined way. Terry Catapano et al (2008)\textsuperscript{70} states that by reusing MARC records and employing new search engine features and techniques, they are able to bring important and hard to find collections to researchers and archivists. According to them, the Libraries had a large amount of archival collections and no uniform way to find them. This article discusses basic framework for providing a search interface, and addresses metadata issues for the creation of search engine records and collection-level pages.

Candela et al (2007)\textsuperscript{71} present the core elements of the Manifesto and introduce central aspects of the Digital Library framework. The authors examined the system into three types: Digital Library, Digital Library System, and Digital Library Management System. They discussed them in three other core topics: the key concepts that characterize these systems encompassing content, user, functionality, quality, policy, and architecture; the range of roles that actors play in digital libraries from application developer to administrator, to designer, and finally to end-user; and clarification of the different levels of abstraction that help us to talk intelligently about Digital Library Universe.

Hilton (2007)\textsuperscript{72} discuss plans for work with born digital archival material at the welcome library. This article looks at the first steps taken by the welcome library to include born digital material into its collections. The authors say that the library enjoys significant support for its plans to collect digital material both from internal management and from archival staff. They state that the work that they had done to date has been to test and further refine key principles.
Jayaja Krishnan (2007)\textsuperscript{73} provides an overview of the organization and management of the media resources collection in media libraries with example of how it is organized at media library of the Consortium for Educational Communication (CEC), New Delhi. It informs the readers the applications and convergence of Information Communication Technologies (ICT) helps in distribution and dissemination of knowledge resources in a converged environment.

Gemmill (2005)\textsuperscript{74} provides a three-pronged approach to digitization, namely Creation of content, development and focussed on outreach. They further states that these approaches were critical to the success of Ohio Memory online Scrapbook. Project involved 350 historical societies, libraries and museums throughout Ohio (USA) Library.

White (2005)\textsuperscript{75} studies two digital archives designed by library and information professionals and historians to highlight the twin issues of academic authenticity and accuracy of digital representations. The author finds that the academics are often distrustful of the authenticity of information that appears in digital form and doubtful as to its accuracy.

If a digital library project is to be successful, the project needs to be run in a professional manner, using project management techniques says Cervone (2004)\textsuperscript{76}. This study points out some of the most important aspects of project management such as understanding the project requirements, role of planning, accurately determining budget and schedule, controlling the scope of the project, and developing expertise. In order to accomplish this, the project manager needs to be a multifaceted leader as well as technically adept.

Cole (2004)\textsuperscript{77} reports in the fall 2002, that the University of Illinois library at Urbana-Champaign received a grant from the Institute of Museum and Library Service (IMLS) to implement a collection registry and item-level metadata repository for digital collections and content created by or associated with projects funded under the IMLS National
Leadership Grant (NLG) programme. The authors describe the genesis of the project, the rationale for architecture design decisions, challenges faced, and the progress.

The present status of digitization of Indian Management Libraries through a survey was carried out by Gaur (2003) in 500 management libraries in India. The issues such as library automation, development of digital libraries, and use of bar code and smart card technology have been discussed. Issues responsible for the widening of the digital divide have also been identified.

2.6. INSTITUTIONAL REPOSITORIES (IR) AND OPEN ARCHIVES INITIATIVES (OAI)

Nykanen (2011) the research reported in this article was undertaken to determine the level of implementation of institutional repositories (IRs) at small institutions enrolling fewer than 10,000 students. The study analyzed quantitative and qualitative data from IRs at a number of small institutions with the aim of observing relevant patterns and trends that may or may not be unique to small institutions. The study concludes that IRs at small institutions exist in significant numbers, and they exhibit some unique patterns, particularly in the benefits and challenges specific to small institutions, the association with IR consortia, and the focus on student research.

Owen (2011) in this article, examines the development of a digital repository, specifically how the focus on acquiring content for the repository has transitioned from faculty-published research to include the gray literature produced by the research centers on campus, including unpublished technical reports and undergraduate research from honors programs. This material has the benefit of fewer copyright restrictions, making acquisition much less problematic. Inclusion in the repository increases the creditability of the research center and provides wider distribution of this often under-recognized research.
Document servers complying with the standards of the Open Archives Initiative (OAI) are rich, yet seldom exploited source of textual primary data for research fields in text mining, natural language processing or computational linguistics. Mathias et al. (2011) presents a bilingual (English and German) text corpus consisting of bibliographic OAI records and the associated full texts.

Sawant (2011) studies various issues concerning the IR software/system involved in development of institutional repositories (IRs) in India. This is the first detailed study focusing on the IR system/software aspects of IR. The present study has identified the existence of 16 functional IRs, some of which were not registered in any of the directories such as ROAR, Open DOAR.

Hossain (2010) gives a brief idea about the current practices about authentication and authorization for institutional digital repositories. They have suggested that, in access management as other matters are related to policy or administrative decisions, the user authentication, authorization and digital material authentication are most necessary issues. This interview paper states that in support of digital repository, a series of new technical and policy issues emerge in the cross-organizational authentication and access management content. In this paper, it has been illustrated that secured process digital repository whose is ultimate objective is information sharing and dissemination, though it has not shown any model or architecture regarding any types of technical aspects whether it has been tried to introduce the terms and methods or even that factors for access management for digital content provides.

Tarrant et al. (2009) shows how OAI (Open Archives Initiative) and ORE (Object Resource and Exchange) is being used to manage content in digital repositories, in particular institutional repositories and has the potential ultimately to transform the conception of digital repositories. Authors implicate to remote storage where content is represented and accessed via an OAI-ORE resource map. This paper provides a concise introduction to the OAI-ORE specification, from its roots in web architecture through the
development of multiple serialization formats. They focus on how ORI-ORE can be used to represent aggregated publication records.

Mittal (2008) highlights the state of digital libraries and repositories in India in late 2007. Originality/value—the paper is the first of its kind that attempts to identify and evaluate digital libraries and repositories in India. It also gives a comprehensive listing of digital libraries and institutional repositories in India available in the public domain.

Zuccala (2008) carried out face-to-face interviews with managers of five different types of repositories through Web-based survey methods. The LexiURL Web link evaluation software was used for data analysis. The study reveals that few managers received formal training, the repositories were relatively new, web statistics used to monitor the use of the repositories. The authors strongly believe that digital repositories require ongoing evaluation to determine their quality and new directions for growth. Repository managers need formal training in the future for better use of digital libraries.

Miguel et al (2008) briefed about digitization, self-archiving, policies, service plans of University of Mihno Repository. The authors also provide some figures on the results of the strategic plan and explore future initiatives being devised to further increase the adoption of the repository.

Vaidya (2007) states that Open Archive Initiatives are a boom to scientists, researchers, teachers and students. He suggests that internet connectivity is the only precondition to access self / institutional archieves and opens access journals. In his article, he had provided two complementary strategies for achieving open access to scholarly journal literature and has illustrated features, benefits and advanced search features of open J-Gate.

According to Kaczmarek (2006) digital library initiatives have encouraged the development and implementation of repository software applications such as DSpace, Eprints, and Greenstone. These applications are being commonly deployed within the
context of institutional or digital repositories. As the boundaries of, and landscapes around, institutional or digital repositories become more clearly defined and expressed, there is a greater need to have useful methods for evaluating repository software applications and the role they play in the broader context of repository services.

Jantz (2006) examines what is implied by the term ‘trusted’ in the phrase ‘trusted digital repositories.’ Digital repositories should be able to preserve electronic materials for periods at least comparable to existing preservation methods. This article reviews issues relating to building a trusted digital repository, highlighting some of the issues raised and possible solutions proposed by the authors in their work of implementing and acculturating a digital repository at Rutgers University Libraries.

Day (2006) deliberates the potential role of institutional repositories in supporting research assessment in universities with specific reference to the Research Assessment Exercise in the UK. He considers the way in which they might be used to enhance the research assessment process in the UK. Initially, he explains the role of repository in providing institutional support for the submission and review process, later he considers the way in which citation linking between papers in repositories, might be used as the basis for generating quantitative data on research impact that could be used for assessment. Finally his study explains other ways in which repositories might be able to provide quantitative data.

Raghavan (2006) states that Open Access is being increasingly projected as a solution to the crisis in access to scholarly research triggered by the high cost of periodical publications. Further opines that this study sets the movement against the backdrop of factors that contributed to the Open Access; examines the major solutions practiced and proposed to overcome the barriers to access scholarly research.

Indian National Science Academy (2006) the learned scientific society with its aim of promoting progress and upholding the cause of science in pure and applied branches, publishes 11 journals in all front-line scientific disciplines. It has taken the lead in India in providing open access to Indian research by making available the electronic versions
of its journal over the internet. The academy feels that an open access to research literature archives imparts a quick impact and makes quality articles much more visible. Retrospective digitization of back files is complete and they are accessible. Unlike the open access journals of some of international publishers, the Indian Academy of Sciences does not charge authors for publishing their papers. Government funding and subscriptions to their print journals meet the cost of publishing.

According to Jones (2006)\textsuperscript{94} a wide variety of contents may be included in the digital repositories for the multiplicity of purposes and users. He states that it is the technical ability and administrative policy decision that, what kind of material goes into a repository. The authors say that a proper digital repository not only requires an organised collection of digital content, but also requires that the content be accessed and distributed as widely as possible to legitimate users around the globe.

According to Ray (2006)\textsuperscript{95} without a proper access management mechanism and confidentiality, integrity of information cannot be guaranteed. The authors suggest that different conventional methods are practiced by the content-providers, but not a single method is sufficient for access management.

Das (2006)\textsuperscript{96} discusses the importance of an Institutional Repository and the collection development among Indian repositories. The authors found that most of the repositories are using open source software like Dspace, Greenstone and GNU EPrints. The authors also observes that most of the repositories have these and dissertations, seminar papers, journal articles, etc. Some of the problems of the repositories have been highlighted and suggestions offered.

Rajendran (2005)\textsuperscript{97} presents a case study of preserving the print version of the theses and dissertation into electronic form submitted to the SRM Institute of Science and Technology, a Deemed University in Tamil Nadu (India). They are of the opinion that submission of electronic dissertation and these therefore become very popular in

39
developing countries, in India approach towards the practice of submitting electronic dissertation and theses is infancy stage.

Premchand et al (2004)\textsuperscript{98} have highlighted in their study the importance of Institutional Repositories, open access movement and use of OAI-PMH complaint software for creating institutional repositories. They also described about the current development of Open Access Initiatives, Open Archives Initiatives. Protocol for metadata harvesting (OAI-PMH), which is an important infrastructure component for establishing institutional repositories. They also highlighted the role played by the INFLIBNET Centre for launching the project of institutional repositories where information will be kept in digital archives and access will be given to all free of cost.

Lesile (2004)\textsuperscript{99} examines the emerging trend of university-based institutional repositories (IRs) designed to capture the scholarly output of an institution and to maximize the research impact of this output. The relationship of this trend open access movement is discussed and challenges for using institutional repositories to promote new modes of scholarship are provided.

Rajashekar (2003)\textsuperscript{100} the first endeavor to be successfully implemented the collection of e-prints, and institutional repository of research output from premier Indian research institute, the Indian Institute of Science, Bangalore (http://eprints.iisc.ernet.in). The archive is maintained by National Centre for Science Information (NCSI) and it, supports self archiving by IISc’s Scientists of research publications in various file formats (PDF, MS-Word, HTML, etc). This open access system facilitates seamless access, thereby increasing international visibility for this research. India, with its large R&D base of federally funded organizations has a great potential for open access publishing.

2.7. DIGITAL LIBRARY SOFTWARE

Vinod Kumar (2011)\textsuperscript{101} describes briefly the design and development of a machine-readable Sàñskrit-English glossary for Yoga and allied sciences using GSDL (Greenstone
Digital Library software. Applications of glossary in an information system are mentioned.

Raghavan (2010)\textsuperscript{102} states that based on an ongoing project at the Sarada Ranganathan Endowment for Library Science, a collaborative approach to developing South Asian language interfaces as also test: collections in Greenstone has been elaborated. Some of the novel features of the work that has been carried out so far are explained with illustrations. Some of the issues that need to be addressed as also strategies that could be adopted for enhancing the utility and value of digital libraries are briefly examined.

Joteen Singh (2010)\textsuperscript{103} presents design of a library software, which is interoperable in nature and supports networking and exploitation of web resources apart from automating library operations.

Lochaas (2010)\textsuperscript{104} had made an attempt to explain about open source software. They state that the website introduces librarians to using open source software and provides tips for implementing and evaluating the transition, ideas for funding and suggestions for open source software to use in the library. They had provided a website http://llslis.uiowa.edu/slocg gaas/oss/libraries. The authors had discussed about Linux software. They say that most desktop computers run on windows or Mac, and Linux remains as open source alternative, capable of being installed on a variety of hardware devices.

To streamline the process of getting raw material into XML, Jody DeRidder (2010)\textsuperscript{105} developed a desktop application-archivist utility, which processes spreadsheet data into XML using a flexible template system that is rather more sophisticated than, but similar in concept to mail merge. Adding support for additional types of metadata is straightforward and discussed. The authors state that the web delivery system, Acumen, is built of PHP, JSON, Java Script and HTML5, using MySQL to support fielded searching. Recognizing that spreadsheets are more user-friendly than XML, an accompanying
widget, archivists utility, transforms spreadsheets into MODS (Metadata Object Description Schema) based on, rules out that Acumen, Archivists Utility, and all supporting software scripts will be made available as open sources.

Fay (2010)\textsuperscript{106} presents a comparison of repository software that was carried out at LSE in support of digital library infrastructure development. The initial phase of the article has investigated digital collection at LSE (London School of Economics and Political Science), their users and best practice in the wider community and produced functional specifications for testing against the current. Open source repository software. Following this comparison, the author had made a recommendation for the implementation of a repository system to operate at the core of their digital library.

Mitchell (2008)\textsuperscript{107} recommend that use of blogging software as an interface to digital library content stored in a separate repository.

Avram (2007)\textsuperscript{108} explores the knowledge work practices in a distributed software development setting. The author has undertaken an empirical study in the Irish subsidiary of a multinational company over a 16 month period. The author highlights the ways in which technical and social factors are in intricately entwined in distributed work settings.

Vaidya (2006)\textsuperscript{109} discusses the multilingual support of E-Print Digital Library Software and its facilities multilingual user interface; found that E-Print software is suitable for handling Indian languages.

Goh et al (2006)\textsuperscript{110} makes a comprehensive comparative study on CDSware, EPrint, Fedora, and Greenstone digital library software with 12 categories of items. Greenstone is found to be the best performer, followed by CDSware, Fedora and EPrints. Greenstone is the only software package that consistently fulfilled the majority of the criteria in many of the checklist categories. In contrast, Eprint is the worst performer due to its poor support for certain features deemed important in the checklist, and a total absence of functionality in other categories.
Dion Hoe (2006)\textsuperscript{111} develops a checklist for DL evaluation and use this checklist on four DL software packages (CDSware, EPrints, Fedora, and Greenstone). The present work attempts to develop a comprehensive checklist for assessing DLs. Its flexibility allows users to tailor it to accommodate new categories, items and weighting schemes to reflect the needs of different DL implementations.

Zhang (2006)\textsuperscript{112} in their case study describes why Greenstone Digital Library software chosen and it has been customized for organizational requirements and integrated it into digital library environment.

Sonkar (2005)\textsuperscript{113} discusses in detail all the issues related to the development of digital library of newspaper clippings and implementation of 'Greenstone Digital Library' software in developing such collection.

Witten (2005)\textsuperscript{114} says that the customization features available in Greenstone digital library software are capable to accommodate variety of digital formats which is very important in a digital library. Further the authors found that Greenstone digital library (GSDL) software is a comprehensive system for building and distributing digital library collections and publishing it on the Internet or on removable media such as CD and DVD.

Sharad Kumar et al (2005)\textsuperscript{115} discusses in detail all the issues related to the development of digital library of newspaper clipping and implantation of Greenstone Digital Library Software in developing such collections. The authors indicated special features of GSDL Software and had explained the steps for installation of GSDL on windows (web library). They state that Greenstone offers scores of collection and represents that cutting edge of digital library research using greenstone as a vehicle for dissemination.

Prudlo (2005)\textsuperscript{116} discusses LOCKSS, EPrints, and DSpace in terms of their use cost, underlying technology, the required know-how, and functionalities. Digital initiatives such as pre-print, post-print and document servers are being created to come up with new
ways of publishing. Institutions interested to go beyond archiving journal literature can use EPrints or DSpace. They are suitable for institutions interested in providing access to material that is produced on their campuses in addition to preserving journal literature. The author concludes that the EPrint is a viable option for archiving material on a specific subject matter, while DSpace is especially suitable for large institutions that expect to archive materials on a large-scale from a variety of departments, labs and other communities on their campus.

The availability of digital content in Indian languages and supporting by word processing systems were highlighted by Shivaram (2004). There is a need for digital library software for organizing and provision of access to these materials. In this connection the authors experimented with using Greenstone digital library software and succeeded with some limitation.

Jones (2004) examines the similarities and differences between digital object management systems Dspace and ETD-db (Electronic Thesis and Dissertation-database file) to determine their applicability in a modern E-theses service. Finally after analyzing both digital library software, the author found Dspace is better than ETD-db.

Smith (2003) describes the Dspace system including its functionality and design, and its approach to various problems in digital library and archives design. The second part discusses the implementation of Dspace at MIT, plans for federating the system, and issues of sustainability.

Witten (2001) describes the Greenstone digital library software, an open-source system for the construction and presentation of information collections. It builds collections with effective full-text searching and metadata-based browsing facilities that are attractive and easy to use. Moreover, they are easily maintained and can be augmented and rebuilt completely automatic. The system is extensible: software 'plugins' accommodate different document and metadata types. Greenstone incorporates an interface that makes it easy for people to create their own library collections.
Collections may be built and served locally from the user's own Web server, or (given appropriate permissions) remotely on a shred digital library host. End users' can get easily new collections, styled after existing ones from material on the web or from their local files (or both), and collection can be updated and new ones brought online at any time.

2.8. DIGITAL LIBRARY USABILITY AND EVALUATION

Aaltonen (2011)^1^ made a study, in which e-book readers were given to students for one study period with all the course material provided in electronic format. Feedback from the students was collected through discussions, study diaries and questionnaires. In the library, the e-book readers were tested in order to see what demands and restrictions they pose on e-materials and how well the current e-collections of the library are usable on these devices. Results suggest incompatibilities with many licensed e-materials, whereas most open access materials can be easily downloaded and used.

Nykanen (2011)^2^ reported a research, which was undertaken to determine the level of implementation of institutional repositories (IRs) at small institutions enrolling fewer than 10,000 students. The study analyzed quantitative and qualitative data from IRs at a number of small institutions with the aim of observing relevant patterns and trends that may or may not be unique to small institutions. The study concludes that IRs at small institutions exist in significant numbers, and they exhibit some unique patterns, particularly in the benefits and challenges specific to small institutions, the association with IR consortia, and the focus on student research.

Terry (2011)^3^ in the article, the development of a digital repository is examined, specifically how the focus on acquiring content for the repository has transitioned from faculty-published research to include the gray literature produced by the research centers on campus, including unpublished technical reports and undergraduate research from honors programs. This material has the benefit of fewer copyright restrictions, making acquisition much less problematic. Inclusion in the repository increases the creditability
of the research center and provides wider distribution of this often under-recognized research.

Document servers complying with the standards of the Open Archives Initiative (OAI) are rich, yet seldom exploited source of textual primary data for research fields in text mining, natural language processing or computational linguistics. Mathias et.al (2011)\textsuperscript{124} presents a bilingual (English and German) text corpus consisting of bibliographic OAI records and the associated full texts.

Tsakonas (2011)\textsuperscript{125} aims to reveal explicitly the main concepts of digital library evaluation domain and their correlations, and it tries to combine creatively and integrate several scientific paradigms, approaches, methods, techniques, and tools. This article demonstrates the added value features of the ontology, which are the support of comparative studies between different evaluation initiatives and the assistance in effective digital library evaluation planning.

Liu (2011)\textsuperscript{126} explore the extent to which undergraduate and graduate students in China differ in their digital library use. Unlike the factors promoting digital library use, non-use factors, perceived influences, and degree of satisfaction are quite different between undergraduate and graduate students due to their differing emphases and expectations for information. The implications for digital library services are also discussed.

Trivedi (2010)\textsuperscript{127} examines aspects related to digital libraries, notably the ease of access, function and use. It is noted that digital libraries are those facilities in which information is stored in a digitized format and accessible by a computer. The author states that digital libraries will gain in popularity in India as the 21st century progresses. A number of topics are addressed including characteristics of a digital library, the function of such installations, and how to plan for the creation of a digital facility.

Daneshgar (2010)\textsuperscript{128} focus on organizing customer knowledge in academic libraries. Availability of sophisticated ICT infrastructure combined with emerging business
processes such as various service orientation configurations, constitute major characteristics of many of today's libraries in western universities are demonstrated in their case study. This case study is probably the first attempt in discovering and explicating some of the underlying components of customer knowledge in academic libraries of today. The authors propose a categorization scheme for customer knowledge in academic libraries with the aim of improving knowledge-related activities in western universities. Their study also presents an evaluation methodology for assessing consistency of the proposed categorization scheme.

Mayank (2010)\textsuperscript{129} had made an attempt to provide instant access to digitized information and had discussed about components of digital library and creation of digital resources, he had emphasized on functions and characteristics of digital library in India.

Jane Nicholas et al (2009)\textsuperscript{130} explore the Oregon State University (OSU) Libraries history from formation to work it took on. The merits and challenges that usability teams bring to an organization are also discussed. To date, the literature describes usability methods and shares findings from libraries usability studies but none discusses benefit, a standing usability team brings to a library organization or the work it may do.

Deshpande (2008)\textsuperscript{131} studied the information needs of the users at astronomy and astrophysics libraries and information centres in India. The purpose of this study was to create a substantial body of knowledge factors that influence the success of electronic journals. The authors found, that the increasing use of the electronic information-seeking environment has produced changes in the practice of science.

Zhang et al (2008)\textsuperscript{132} investigated the efforts of different search and browse features in Digital Libraries. For this study the authors used ACM, IEEE CS, and IEEEXplore Digital Libraries. The study identified that both search and browse designs lead to poor user interactions; user interactions were affected by specific design features in Digital Libraries; some of the design features may lead to reduce user performance and should be
improved. This study provided empirical evidence to the effects of interaction design features in Digital Libraries on user interactions and performances are very important.

Das et al (2007) studied and evaluated different retrieval features of Indian digital libraries, especially those which provide access to multilingual and multimedia documents. For this study, the authors' selected eight digital libraries from India, which are available 24x7 timeframe and accessible world wide through Internet, found in the entire library, are using open source digital library software which has minimum usability functions.

Cousins (2006) presented an overview of the European Library as a portal and discussed the issues of usability, multilingual access to the cultural heritage; search and retrieval with different languages in Europe's National Libraries are challenging one.

Bertor et al (2006) suggested that usability, functionality and accessibility testing of digital library information services and products are essential for providing high quality services to users. The authors demonstrate the potential roles of multiple, interactive evaluation strategies in the development and refinement of digital libraries; details the methodologies that focuses on how the services meet the users' head; and encourage further discussion of the uses of these multiple evaluation approaches in assessing digital libraries.

According to Cherl (2006) reference interactions with patrons in a digital library environment using digital reference services (DRS) have become widespread. However, such services in many libraries appear to be underutilized. A study surveying the ease and convenience of such services for patrons in over 100 academic health science library Web sites suggests that cumbersome access and difficulty of use may be a key restraining force.

Long (2005) provide the results of research to evaluate the usability of a University of Colorado at Boulder Libraries digital initiatives project that provides online access to historical Aerial Photographs of Colorado. This paper describes usability testing
conducted as a part of a user-centered redesign. The usability testing reveal the needs of the project's target user group and identified issues with the interface that will be addressed in its redesign. It has also contributed to the larger understanding of how researchers use digital Aerial Photographs and their preferred methods of access and desired functionalities.

Quijano-Solis (2005)\textsuperscript{(138)} presents some of the results from a survey aimed to explore describe and explain some of the usability characteristics in digital libraries evaluation in the Mexican context. The study is framed in the evaluation of a multinational and monolingual digital library: the Miguel de Cervantes Virtual library, from the University of Alicante in Spain. The evaluators were Mexican "experts" users (i.e. Spanish-speaking professional university librarians specialized in electronic reference services) who were asked to carry on an evaluation instrument based on usability criteria as taken from some models in developed countries.

Bertor (2004)\textsuperscript{(139)} identified a number of evaluation strategies to assess digital libraries through a number of approaches which can yield a variety of data regarding the efficiency, effectiveness, and quality of digital libraries. The results from these evaluation strategies can have a number of significant implications for the continued development of digital libraries.

Xia (2003)\textsuperscript{(140)} gave an overview of research conducted at Victoria University of Wellington, regarding the perceptions and expectations of user communities and librarians. This research examines the extent, which users and librarians perceptions of the usability of digital services differ.

Choudhury (2002)\textsuperscript{(141)} provided an overview evaluation study of CAPM (The Comprehensive Access to Printed Materials) project and discusses thoroughly the implementation of the methodology for the CAPM project. With increasing expectations from users, greater accountability, and rising costs, the need for evaluation is very much important for evaluating digital libraries.
Bollen (2002)\textsuperscript{142} proposed a quantitative approach to digital library evaluation that analyzes the retrieval habits of users to assess the impact of a collection of documents and to determine the structure of a given digital library user community. The authors discuss a system that was developed to automatically generate extensive journal and document networks from an efficient and simple analysis of user retrieval sequences registered in a particular digital library's server logs which was written in JAVA, to transparently and efficiently perform the required analysis.

Allen (2002)\textsuperscript{143} suggests web interfaces for digital libraries; focuses on a usability study conducted at the University of South Florida. The author highlights discrepancies between actual performance and perceived performance and need to use plain languages and less jargon for better search result.

2.9. STUDIES ON DIGITAL PRESERVATION

Yuan Li. (2011)\textsuperscript{144} examines the current practices of digital preservation of IR materials, the survey of 72 research libraries reveals the challenges and opportunities of implementing digital preservation for IRs in a complex environment with rapidly evolving technology, practices, and standards. Findings from this survey will inform libraries about the current state of digital preservation for IRs.

Seifi (2011)\textsuperscript{145} discusses the importance of manuscripts and digital preservation of manuscripts, Chronology and Universal initiatives in digital preservation of manuscripts; Collection and details on how manuscripts are digitized in central library of university Tehran are also discusses and conclude with references.

Jin Lee (2010)\textsuperscript{146} reviews the current status of collaboration in cultural heritage preservation in East Asia, including digital projects, and to suggest practical improvements based on a cultural structuralism perspective. There has been little literature published on East Asian cultural heritage initiatives, particularly in the area of digitisation and digital preservation.
Del Pozo (2010)\textsuperscript{147} brings together and clarifies some of the core ideas and theories in digital preservation, in order to better facilitate the minimisation of change in the digital objects stored by the National Library of Australia.

Pandey (2010)\textsuperscript{148} discussed the ongoing digital programmes on preserving resources in Indian scenario and had attributed on strategies for preservation of digital resources and had presented on Challenges, Management, Funding and Standardization of digital resource preservation.

David (2010)\textsuperscript{149} claims reviewing a typical claim of storage system reliability, showing that it provides no useful information for bit preservation purposes. He proposes the article “bit half-life” as a metric for bit placed upon preservation systems in terms of this metric, and investigates the feasibility of bench marking systems to see if they meet these requirements. His studies uniformly report that storage reliability actually delivered to applications such as digital preservation system is much less than that claimed by the manufactures of system and component. His article concludes that the current storage technologies fall well short of current requirement for bit preservation.

Jose Barateiro (2010)\textsuperscript{150} intend to propose a perspective where Risk Management can be used not only to assess existing solutions, but also to conceive digital preservation environments. The authors generalize and survey the main requirements that are vulnerabilities and applications regarding the proposed to digital preservation, regarding the proposed of requirement and the taxonomy of threats and vulnerabilities.

David Minor (2010)\textsuperscript{151} explore major themes within chronpolis, which is a digital preservation data grid framework developed by the San Diego Super Computer (SDSC) at U C San Diego, the U C San Diego Libraries (UCSDL), and their partners at the National Center for Atmospheric Research (NCAR) and University of Maryland’s Institute for Advanced Computer Studies (UMIACS). The article focuses on the philosophy and theory behind Chronopolis Preservation, core tools and technologies used and metadata schema behind development of chronpolis.
Shah (2009)\textsuperscript{152} has discussed about digital video preservation, in which he had described about digital video Curation, collection visualization, browsing interfaces, video harvesting and monitoring. He has presented some preliminary work on various issues of digital Curation and in particular digital video preservation and building a system to implement it.

Dappert et al (2009)\textsuperscript{153} in their article has introduced a conceptual model for expressing the core concepts and requirements that appear in preservation of guiding documents. They have defined a specific vocabulary that institutions can reuse for expressing their own policies and strategies. They have shown how these requirements can be used in the content of comprehensive preservation planning.

McEwen (2009)\textsuperscript{154} presents the File Information Tool Set (FITS) that enables digital preservation to accept different file formats which will be used by the Harvard University Library (HUL) in Cambridge, Massachusetts. It states that FITS can wrap around open-source tools to combine, normalize and invoke their output. It cites JHOVE, File Utility and FFIdent as the first version to be wrapped by FITS.

Saxena (2008)\textsuperscript{155} states that in this digital era libraries will need new capabilities to collect and maintain born digital materials, besides they also will need to develop new capabilities to preserve all the digital information under their control. The authors reveal that whatever accessible to anyone, anywhere, on any day of the week or at any time of the day. All organizations with responsibilities for preserving digital information are seeking better technical solutions, model policies, in this article all these points are touched upon and discussed in detail.

Anderson (2008)\textsuperscript{156} has made an attempt on preservation program, in which he has indicated that interoperability is a challenge in all aspects of collaborative work. He has stated that the digital preservation program is intended on strengthening current partnership while adding new types of partners and identifying tools and services for the network.
McDonough (2006)\(^{157}\) has stated that the digital library community is increasingly concerned with long-term preservation of digital materials. This concern presents an opportunity for strategic alliances between digital library units and preservation departments confronting the difficulties inherent in preservation reformatting of moving image materials.

Ramesh Babu (2006)\(^{158}\) has outlined the concept of digitization and the functions to be considered while going for digitization. Further discussed the concept of digital library preservation; pros and cons and research on digital preservation. Highlighted the role of librarians in the age of digitization and barriers in the Indian context.

Mikeal et al. (2006)\(^{159}\) had presented results of a case study that addressed many issues surrounding that difficult task of preservation in a digital library. They focussed on a subset of these issues as they apply to the preservation of scholarly articles encoded in the current web standards. They described two common preservation mechanisms emulation and migration, and had compared two approaches to migration, automatic and manual and discussed their strength and weakness.

Rakesh Prasad (2006)\(^{160}\) had made an approach towards preservation of library resources in digital environment, in which he had mentioned about various types of media for digital preservation, selection of preservation technique and had explained about the process of preservation. He had discussed about preservation trends in India and mentioned challenges, advantages and disadvantages of digital preservation.

Jantz (2005)\(^{161}\) described the importance of digital preservation, the technology available for the digital repositories. A basis premise of this article is that, there are many technologies available today that will help us build trust in a digital preservation process and that these technologies can be readily integrated into an operational digital preservation framework.
Vijaya Kiran (2005) highlighted the problems and prospects present in preservation of digital resources. They also explained the preservation strategy and physical storage condition required for digital objects.

The current practices in digitizing library materials in the USA was investigated by Liu (2004). Building a good digital collection has been a common task, pervasive in all type of libraries. According to Liu, digitization becomes more and more crucial, affecting libraries while they work towards becoming digital. Through probing some widespread issues on what materials to digitize, this survey of current literature reveals, a number of prominent library digitization practices, methods and challenges, and highlights the best practices, trends and interests in library digitization pertaining to both policy and technology marketplace issues.

Woodyard (2002) in his report, gave high priority to digital material preservation with all its collection strategies now having a direct or implied digital component for the British Library. Lists types of digital materials already acquired; further sets out preservation policy objectives, including pressing the government for new legal deposit legislation. Also describes various projects in which the library is involved on different aspects of digital preservation, including archiving the email of literary figures, specific scientific collections, and significant web sites, as well as the Cedars and Lockss projects. A major project is a computer system called the digital library store, based on the Open Archival Information System (OAIS) reference model. Collaborative projects include involvement in the Digital Preservation Coalition (DPC) and in two OCLC/RLG working groups, and links with the National Library of the Netherlands.

2.10. METADATA AND OTHER STANDARDS

Sabharwal (2011) addresses knowledge creation through the metadata record and how interdisciplinary affects the metadata record. The discussion of the ontological dimension focuses on semantic navigation, interoperability, and the relationship of taxonomies to interdisciplinary. A number of digital initiative projects illustrate the concept of knowledge domain navigation.
Jiang (2011) states that semantic web generation is a key process in semantic digital library construction, which converts metadata of digital resources into semantic web data. One important type of metadata in publications, called affiliation, is hard to convert into semantic web data precisely because different authors, who have the same affiliation, often express the affiliation in different ways. To address this issue, this paper proposes a clustering method based on normalized compression distance for the purpose of affiliation disambiguation.

Yasser (2011) finds, problems in metadata records as reported in the literature are compared and analyzed. It is found that five categories of metadata problems can be identified, viz Incorrect Values, Incorrect Elements, Missing Information, Information Loss, and Inconsistent Value Representation. Given that these problems are detrimental to the services, the author adds that it can be provided by metadata, preventive or corrective measures need to be put in place so as to ensure that the benefits derived from using metadata balance the costs and efforts spent in the creation of metadata records.

Martin (2011) provides an example of how the University of Illinois at Chicago Library (UIC Library) consolidated previous metadata practices into a single data dictionary that covers all digital objects managed through the CONTENTdm collection management program. The work done at the UIC Library streamlines preparation and metadata creation for new projects, standardizes metadata within CONTENTdm, promotes consistency and comprehensiveness for sharing beyond CONTENTdm, and provides a foundation for further standardization.

Pal (2010) recognizes some emerging issues on metadata as a mechanism of resource discovery and its impact on precision of search results in a distributed network environment. It aims to present a brief account of the major metadata initiatives taken during the last couple of years, thus provide glimpses of recent activities on metadata across the globe. It also highlights a consistent growth of multiple metadata standards to meet the variety of needs in a hierarchy of complexity. The paper examines various
metadata-harvesting tools and related technologies that fulfill the task implicit in a user's search. Discussion brings out some popular standards, useful protocols, and open-source harvesters along with their intrinsic capabilities for harvesting and presenting metadata. It also emphasizes on a variety of metadata services viz., OCLC's metalogue service, UKOLN metadata editor service, OAIster harvester service, DP9 gateway service, etc. that are predominantly used in different metadata communities. Attempt has been made to explore the underlying principles of metadata-harvesting in DSpace and web search engines.

Rouber (2010) has presented the “lib viewer”, a java-based user interface to digital libraries using metaphor graphics to display information on the elements in a digital library in an intuitively understandable way. They had argued in favour of the representation of digital information to allow the user to get an instant overview of the information available.

Zentner-Raasch (2010) has discussed about digital images and metadata issues. He states that understanding of the long tail and the order of order together provide a sound foundation for examination of management of metadata in relation to digital images. His article showed the importance of each step of the metadata process, why each step is critical to the success of a project, upon where one is standing.

Kowal (2009) in the project described in this paper, the British Library employed existing library standards and systems to accomplish key functions of a project to digitize a selection of maps contained within rare books. The integrated library system, using the Anglo-American Cataloguing Rules (AACR) and Machine-Readable Cataloging (MARC) format, acted as a lynchpin, linking directly bibliographic descriptions of both the original and the digital copies of the map, the book containing the map, the digital image, and preservation data and strategy, making the items widely searchable and visible while uniting them with the broader collections.
Devika (2009)\textsuperscript{173} discusses the various issues involved in Indian languages computing, particularly Telugu, like creating, displaying, searching and retrieving digital content. The authors stress the importance of presenting grammar, syntax and morphology of Indian language while creating metadata in Indian languages.

Casey (2008)\textsuperscript{174} states that, “The future of bibliographic control will be a collaborative, decentralized, international in scope and web-based.” She examined the dynamic nature of the current metadata landscape and the rapid changes facing metadata and bibliographic control in the world-wide web environment.

Connaway et al (2008)\textsuperscript{175} explores the different age makes in searching for materials and the thinking skills used for metadata searchers. The authors say, “A major challenge facing today’s libraries to develop and update both traditional and digital collection and services, to meet the multiple generations of users with different approaches to information seeking.

Pearce et al (2008)\textsuperscript{176} discussed a common way of packaging and exchange digital content in a future Australian data commons, a national corpus of research resources that can be shared and re-used. The Australian METS Profile handles complex content models and work across multiple submission and dissemination scenarios.

“Pro Learn Query Language”, a query language that the authors developed for repositories of learning objects. Ternier et al (2008)\textsuperscript{177} gave a precise description of the semantics of PLQL, concerning both kinds of clauses and their mutual relationship and describe two experimentation efforts around PLQL: one involving the ARIADNE repository and the other the EUN Learning Resource Exchange initiative.

Moore et al (2008)\textsuperscript{178} examined the representation information that is needed about the preservation environment for a theory of digital preservation. The representation information includes descriptions of the preservation management policies, the preservation processes, and the state information that is needed to verify the correct working behavior of the system. The authors demonstrate rule-based data grids that can
verify whether that prior policies correctly enforced preservation properties, while sending into the future description of the current preservation management policies.

Buonora et al (2008)\(^{179}\) felt that wavelets compression of JPEG 2000 produces a high quality images, it is an acceptable alternative to TIFF and a good strategy for the storage of large image assets. Moreover, JPEG 2000 may be considered a format that can guarantee an efficient robustness to bit errors and offers a valid quality with transmission or physical errors.

Weinberger (2007)\(^{180}\) explained how knowledge can no longer be contained within neat, small boxes called catalogues. The range of resources and information on the internet and the World Wide Web has changed forever the landscape of information access and retrieval. The questions explored in that article include why the digitization of images was complex issue, and the relationship of metadata to the digitization of images.

Varatharajan (2006)\(^{181}\) in their article discussed about the digital library and its importance in interoperability while sharing piece of information in the networked digital library environment.

Beall (2005)\(^{182}\) described main types of data quality errors that occur in digital libraries, both in full-text objects and in metadata. The author found the major problems are typographical errors, scanning and data conversion errors which cause metadata errors that limit the harvesting capacity of metadata.

Witten (2005)\(^{183}\) provided a practical introduction to many recent standards and the facts for standards for interoperability, and illustrates them using open source digital library software including online demonstrations of interpretable issues and solutions. The authors use interrelation between Greenstone and DSpace for this case study.

Chudnov et al (2005)\(^{184}\) discussed the Open URLs and metadata auto discovery in scholarly and non-scholarly environments. The authors focus on one opportunity to bridge this gap by promoting the broader application of Open URL-based metadata
sharing. Open URL will lead to the wider adoption of the standard to share references in both scholarly and non-scholarly environments.

Rajesh (2004)\textsuperscript{185} described Unicode as an encoding scheme designed to be a universal character set for written characters and text; it is international in scope characters from all of the major scripts of the world particularly Indian languages.

Godby et al (2004)\textsuperscript{186} proposed a model for metadata crosswalks that associates three pieces of information: the crosswalk, the source metadata standard, the target metadata standard, each of which may have a machine-readable encoding and human-readable description which minimize the error in creating metadata.

Jin (2004)\textsuperscript{187} proposes a OAI metadata harvesting protocol for china networked digital library of theses and dissertations project, initiated by the china academic library and information system, capable of Chinese languages for metadata harvesting, standard document format, intellectual property protection, multilingual and cross-lingual searching, personalization and knowledge organization, etc.

Arms (2003)\textsuperscript{188} found OAI protocol for Metadata Harvesting is very useful to integrate the records for cultural heritage resources from many resources which results less complex than a full MARC catalogue record and considerably richer than the simple Dublin Core Metadata.

2.11. COPYRIGHT AND INTELLECTUAL PROPERTY RIGHTS (IPR)

Ahmad (2011)\textsuperscript{189} focuses on protecting celebrity rights under intellectual property (IP) laws in India, the U.S., Great Britain, and other countries. The authors examine the definition of celebrity and discuss right enjoyed by celebrities, including personality, privacy, and publicity rights. The authors explain how the rights of celebrities can be protected through trademark and copyright. Several legal cases are discussed.
Glushko (2011) discusses the legal problems regarding library digitization and presents solutions to the referred problems. It is stated that the promise of improved access to library materials is provided by the proliferation of born-digital content. It is mentioned that aggressive, full and legal use of library collections could be possible with the help of a simple plan. It is suggested to be familiar with the rights and responsibilities laid out in the Copyright Act. It is recommended to have a healthy attitude toward copyright.

Wells (2010) discusses the Mississippi digital library’s Civil Rights Thesaurus as a developing authority control tool for civil rights-related headings in metadata records. It explores the history of the online Civil Rights Thesaurus beginning at the University of Southern Mississippi’s (USM) McCain Library. It discusses the expansion of the Civil Rights Thesaurus in scope and usage as the other Mississippi Digital Libraries (MDL) began to create metadata records for their digital objects.

Lipinski (2009) reviews recent legislative and case developments in the area of copyright law affecting the collection, preservation including digitization and dissemination of grey literature. Alternative frameworks for crafting a legislative solution to impediments the copyright present to these uses are discussed.

Talwar (2009) had outlined the concept of plagiarism and he had suggested that pressure may help to reduce the likelihood of plagiarism, as one would note want to copy and be faulted by his peers; in addition he had expressed his ideas over legal liabilities—copyright, defamation, racism and stated that teachers may have also to educate students on the legal liabilities for publishing content online.

Besek et al (2008) discusses the impact of copyright law on digital preservation based on Australia, the Netherlands, the United Kingdom and the United State Laws. The study found that, in many cases, digital works are not being preserved in a systematic way. This is partly because digital preservation entails more difficult copyright issues than preservation of non-digital material. All the surveyed countries have some form of
exception for preservation activities. However, there is inconsistency in the details between the countries' laws and apply in the digital environment. None of the countries have a uniform national system for collecting digital materials. The authors suggested that drafting national policies and adapting laws to allow digital preservation to be undertaken as necessary, in accordance with international best practice standards.

Hirtle (2008) argues that copyright restoration has made it almost impossible to determine with certainty whether a book published in the United States after 1922 and before 1964 are in the public domain and the digital libraries that wish to offer books from these period do so at some risk.

Zhang (2007) analyzes and discusses about digital library intellectual property right evaluation method and application scope of commonly used methods. The paper provides recommendations on digital library intellectual property rights evaluation and methods.

Whyte (2007) had provided a report from the legal environment of digital Curation workshop held at Glasgow University on 23rd Nov, 2007. The event provided an overview of legal considerations for non legal professionals who work with data, focusing especially on intellectual property rights and licensing, data protection, freedom of information and privacy, and data as evidence. The workshop was organized in conjunction with the SCRIPT-ed Journal of law and technology, and supported by JISC, the AHRC and Edinburgh, University.

Zhang (2007) pointed out that the electronic resources, number of copies, term of usages, quantity of information, copyright, digital library technologies, inventiveness, usefulness and the access mode are very critical in digital environment.

Seadle (2006) says that the copyright decisions are often, a matter of risk assessment and understanding enforcement procedures is a part of that assessment process.
George (2005)\textsuperscript{200} aims to explore the issues related to acquiring copyright permission with the goal of determining effectiveness and efficiency using the least complex process.

James (2005)\textsuperscript{201} discussed about digitizing materials and its importance in copyright clearance. The author says that legal problems are purely practical ones particularly locating the owner of copyright. He suggests that librarians need to take note of these problems and explore possible solutions in order to build the digital collection accordance with copyright law in order to long run the digital library.

Bansal et al (2005)\textsuperscript{202} had discussed about document protection, which is to be wrapped in a secure cryptographic envelope with the help of MD5 and Hash functions as well as digital signature techniques. They suggest that Digital Library applications span widely disparate content types, values, origins and longevities and added that safeguards are nearly always imperfect.

Shalini (2004)\textsuperscript{203} emphasizes the need of change in copyright laws in providing access to copyright materials in the digital age. The author argues that the balance of “rights” and “exceptions” has been maintained for 300 years needs to be reconsidered for scholarly communications, such as Theses and Dissertations, as well as for articles in electronic journals, since this type of information are fact-based, often resulting from public funds, and is part of the intellectual heritage of academic institutions these are very different from other creative works.

Gupta (2004)\textsuperscript{204} undertakes a review of multidisciplinary studies on Intellectual Property Right from the perspective of their use in Research and Development. It highlights the importance of creating awareness about IPR among scientists and delves upon the studies on patent information for R&D policy and management, and library and information sciences.

Suryavanshi (2004)\textsuperscript{205} had explained various issues associated with intellectual property in information technology. He states that intellectual property will surely survive
the digital age, although substantial time and effort may be required to achieve a
workable balance between private rights and the public interest in information. He points
out those debates over copyright issues matter, because the outcome will have a
significant impact on today’s information sector, companies and will help determine the
character of the digital economy of the future.

Andrew (2004)\textsuperscript{206} provided a number of sample agreements which are useful to adapt
copyright agreement between authors and institution related to electronic theses. The
author suggests that theses held by institutions in paper and electronic format required
copyright agreement obtained from the authors and the institutions for the smooth
function of the digital library.

Thomas (2003)\textsuperscript{207} looks at some of the consequences of the Digital Millennium
Copyright Act (DMCA) the impact on fair use and on the market place in general. The
article also explores the concerns of the developing countries in securing access to
information and the suggestion of the commission on intellectual property rights. Noting
the importance of copy right as a public policy tool, the author pleads for calibration of
the copyright balance to suit India’s national interests. The author also exhorts the
academic community to take active interests in copyright policy matters.

James (2002)\textsuperscript{208} traces the history of Indian copyright Act. Describes various
amendment carried out in it from time to time. Responses of international community to
the challenges of digital technologies for WIPO (World Intellectual Property Right
Organization) in the form of WIPO Copyright Treaty (WICT) and WIPO Performers and
Phonograms Treaty (WPPT) are presented. The prominent copyright issues in the digital
era are identified. It was found that in the Indian Copyright Act, many issues are still left
unaddressed. Amendments in the Act to make it compatible with the WCT are suggested.
2.12. INFERENCES AND CONCLUSION

From the above review of literature, the following inferences could be drawn:

i. The research on digital libraries is a decade old concept.

ii. The concept of digital library has evolved since late 90’s onwards and has grown a discipline by itself that resulted in a number of digital library projects and initiatives all over the globe.

iii. Digital library initiatives are noticed in India since the beginning of the new Millennium.

iv. Several research studies are being conducted on digital libraries all over the world and in India also a considerable amount of work is being carried out.

v. It is observed from the review that the initiatives associated with digital libraries are collaborative in nature in most of the countries.

vi. The research on digital libraries is seen more in USA, UK, China, Australia and India.

vii. It is observed that most of the digital library projects and initiatives are largely funded by the national and international organizations.

viii. The digital library collection is contributed by digitization projects and ETD collections.

ix. The emergence of digital collection and resources has opened areas for research on digital preservation.

x. The review focused on the development of Institutional Repositories (IR) and Open Access Initiatives (OAI).

xi. There are studies on using digital library software which are available open source.
xii. All these studies are focusing on various aspects of digital libraries and some are representing survey type and evaluation of the existing digital libraries.

CONCLUSION

The literature review reveals worthy results that shows much of the literature in this area speculates on the future role of digital libraries. There are a tremendous amount of research efforts and various founds has been devoted to digital library research throughout the world over the past three decades. Most of the early digital library research is focused on building technologies. Since there are no comprehensive study reported on the digital library initiatives by the Engineering Educational Institutions of Andhra Pradesh at national level or at state level or at Zone level, the present study has been aimed at to bridge the gap. Hence the proposed study.
REFERENCES


69


