CHAPTER-II
REVIEW OF LITERATURE

2.1 Introduction

The present age is known as ‘information age’. The new information and communication technologies have brought about commendable interactive communication between the service providers and service users. Modern institutions have developed digital libraries in order to reach out to various sections of society on round the clock basis. The present generation of users is blessed with constant availability of electronic information resources and services. The application of ICT has created new library models like digital libraries, virtual libraries and digital repositories which are aimed to knowledge sharing online. The impact of ICT has been evident in railway, air reservations, banking and insurance sectors, postal services, biotechnology, health care, telemedicine, media and communications, teaching, learning, library and information services, printing technology, e-resources, digitization of documents, digital library, library networking, e-commerce and trade, etc. The past studies dealing with application of Information Communication Technology in modern institutions in general and development of Information Communication Technology skills among modern library professionals are presented in this chapter under the following headings namely – Digital libraries, ICT based library services, ICT resources in libraries, ICTs in libraries, ICT skills of LIS professionals and legal/ethical issues of ICTs.

Researcher has made an elaborative review of literature available on this topic using sources like LISA, Internet, research articles, journals, theses, primary and secondary sources published during the past two decades. Since focus of literature review is to summarize and synthesize the arguments and ideas of others that has already been written on this topic, related literature has been listed as below.
2.2 Digital Libraries

Clement (1994) analyzed the growth, process and impact of digital libraries and reported that virtual libraries have come to stay in modern society as prominent sources of information diffusion and sharing. The scholar examined the salient features of digital libraries and called upon the library professionals to equip themselves with state of the art know – hows and show – hows in order to make digital libraries professionally sound.

Rao and Some (1996) explored the challenges and issues concerning digital libraries in India. The researches have dealt with the evolution of digital libraries in Indian society, impact of digital libraries on users and other practical issues connected with the management of digital libraries in India. The study revealed that digital libraries have tremendous scope in Indian society and that adequate checks and balances are required to improve the status of functioning of digital libraries.

Lakshmi and Suma (1998) evaluated the process of digital library development in India. The scholars observed that sustainable development of digital libraries mainly depend upon systematic management which includes hardware management, software management, collection management, preservation of resources, archiving, and financial management and so on. The study reveals that planning for the IT infrastructure and financial planning are the crucial factors associated with the success of digital libraries in India.

Haricombe (1998) assessed the library trends which revealed the transition of physical library into digital library. The scholar pointed out that recent technological advancements challenged the library personnel and facilitated the conversion of physical library into digital library in modern society. The scholar enumerated the various trends which have a bearing on interactive learning in modern society.

Chowdhury and Chowdhury (1999) conducted digital library research with a special focus on major issues and trends affecting the Indian virtual environment. The scholars observed that India would emerge as a formidable virtual library centre mainly due to technological advancement and trained manpower. The scholars have provided useful guidelines and suggestions for the effective management of digital libraries in Indian society.
Crawford (1999) investigated the issues for the management of digital libraries in modern society and observed that several technological and professional considerations influenced the process of digital library in modern society. The scholar also dealt with technological, social, economical, organizational and professional issues concerning the growth and development of digital libraries.

Graef (1999) examined the system and operations of digital libraries and reported that converting a physical library into an electronic information network can save money, improve productivity and even turn a cost center into a profit center. The library staff moved into ‘mini libraries’ within business units after the closure of physical libraries. The study emphasized that offering a variety of value-added services, such as analyzed reports, current awareness alerts, internal knowledge bases, and desktop access to a variety of internal and external sources over the Internet would make the digital libraries highly efficient and utility-oriented.

Feret and Marcinek (1999) explored the future of academic library and the academic librarian in the new virtual environment. The scholars pointed out that physical library were subjected to revolutionary changes and modifications in the new digital environment. The scholars also suggested necessary guidelines and strategies which would boost the professional status and competence of both academic library and academic librarian in the new age of information revolution.

Guliani (2000) evaluated the role of professional organizations in the development of library and information professionals in the new age of virtual environment and observed that ethnic problems and instructional services caused barriers to the professional progress of immigrants. The scholar suggested certain measures concerning the prior planning and preparation which would help immigrants to the USA secure LIS professional Designations.

O’Leary (2000) studied the emerging trends and developments of virtual corporate library system and observed that digital libraries have come into existence mainly to provide the benefit of globalization of knowledge at the earliest possible opportunity to the mankind. The scholar also pointed out that libraries are required to develop appropriate infrastructural facilities and promote human resources in order to cope with the new virtual environment.
Guenther (2000) assessed the design and management aspects of modern digital libraries. The scholar pointed out that digital libraries are based upon new design and aspirations in the age of new digital revolution. The study primarily dealt with the structure, organization, manpower, technology, operations and other aspects of digital library management. The study also provided useful guidelines on the design and management of digital libraries in modern society.

Steele (2000) analyzed the factors associated with the successful management of digital libraries in modern society. The scholar examined the various issues such as manpower, finance, technology, training, evaluation and so on from the point of view of digital library management. The study suggests that integrated efforts are required to boost the progress of digital libraries in modern society.

Saracevic (2000) conducted the scientific evaluation of digital library in modern society. The scholar primarily focused on the evaluation of digital libraries from the points of view of effectiveness and efficiency. The study provides insight into the criteria for evaluation of digital libraries and suggests that digital library evaluation should penetrate research, practice, or even debate. The scholar suggests that digital libraries should provide for an interaction among people, human knowledge, organizations and technology.

Khan (2000) investigated the role of digital libraries in Indian society. The scholar reported that digital libraries have come into existence in Indian society in good number. The study reveals that proper management is required to achieve the goals of digital libraries in India. The study suggests certain practically relevant media and mechanisms which would improve the status of digital libraries in a developing country like India.

Ravi, Chandra and Sharma (2000) examined the preparedness of Indian organizations for converting traditional libraries into digital libraries in order to achieve success in information retrieval and dissemination to various end users. The scholars primarily examined the emerging trends and the future of digital libraries in terms of their usefulness and cost effectiveness.

Meyyappan, Chowdhary and Schubert Foo (2000) reviewed the status of 20 digital libraries in Indian society. The scholars studied the profile, personnel,
technology, management and operations of leading digital Indian libraries. The study suggests that digitalization of libraries has become the order of the day in India and other nations all over the world. The study also suggested certain measures for the empowerment of digital libraries in 21st century.

Hooper (2001) explored the management issues for the digital library with reference to South Africa which has emerged as a new digital power in the developing world. The scholar has dealt with the modern technologies that are impacting society to create a series of discontinuous social changes. The study puts the search light on the management issues that will impact on the digital library. The study reveals that the vast information – handling capability of contemporary Information Technology creates opportunities to personalize products and services around information resources. The scholar has also suggested that digital libraries should harness their assets – stakeholders, information technology in order to compete and survive.

Mellon (2000) conducted a case study on creating a digital library at the National Research Council of Canada. The study reveals that the institute performs valued research in building codes, urban infrastructure, indoor environment, building envelopes and fire risk management. The scholar suggests that a well equipped digital library provides the benefit of electronic access to a significant portion of the worlds’ scientific, medical and technical information. The study highlights the importance of electronic access to the staff that plays a crucial role in the process of institution building.

Sharma and Viswanathan (2001) evaluated the development and challenges of digital libraries in India and observed that the conversion of traditional to digital library is inevitable in modern society. The scholars have pointed out that appropriate care should be taken to develop systems and managerial skills as well. The study has suggested that measures are required to overcome the menace of computer viruses and also unauthorized use.

Stratigos and Strouse (2001) studied the new trends and developments associated with the establishment and development of digital corporate libraries in modern society. The scholars observed that digital corporate libraries are required to enrich the delivery system in a highly competitive information environment. The
study provides meaningful guidelines on the management of digital corporate libraries in the new age.

Roitberg (2001) assessed the influence of the electronic library on library management in a typical technological university in Europe. The scholar conducted a case study on the impact of new electronic tools and techniques on the modern digital libraries and pointed out that digitization of library has brought about tremendous information diffusion all over the world.

Schrock (2002) analyzed the fundamentals of virtual library and offered practically relevant definition of digital library which is a group of ‘cataloged’ Web sites that extend the resources of educational institutions or public library beyond its four walls. The scholar has also examined the virtual pathfinders which consist of many categorized, annotated, subject-specific and general digital libraries which are available on the Web. The scholar has also suggested certain measures for sharing virtual pathfinders in order to enable the users to make use of the services conveniently.

Jambhekar and Karisiddappa (2002) investigated the digital library system of Indian Institute of Management by following consortia based approach. The scholars have suggested a framework for the design and development of an intranet-based IIM digital system using consortia approach. This model provides digitization of the IIM information resources in a cooperative manner with subscription to electronic journals and data basis through a consortia mode.

Spencer (2002) made a comparative analysis of traditional library system and digital library system and pointed out that in the age of digital library the issues ranged from training staff in ICT skills, empowering whole communities through cooperative funding, the philosophy behind 'People's Network' and the genesis of Sunderland as a 'learning city' through the Libraries Access Sunderland Scheme (LASS). The scholars suggested that library professionals needed different approaches to training and management in the age of virtual environment.

Boyd (2002) examined the paradigm shift from a traditional to digital library and noted that planning the digital library requires a vision that brings changes to all aspects of the library’s operations. The study revealed that the digital library required
much lower real estate costs and computing costs have shifted from the cost of purchasing and maintaining library management software to web development. The scholar further observed that one of the biggest challenges is to meet the expectations of the clients for value – added research.

Buckland (2003) explored five grand challenges for library research which include library service, library theory, library design, library values and library communities. The scholar states that investing in research should be judged in terms of the probability of success since new technologies and tools have drastically changed the electronic environment. The scholar suggests that focused research projects should be undertaken with a view to facilitate effective librarianship and efficient management of libraries – physical and virtual.

Jeevan (2004) studied the digital library development by identifying sources of content for developing countries with special reference to India. The study answers to the basic questions of digitization of Indian libraries and elaborates on the various kinds of contents that can be sources for digital libraries. There are not many studies in this area conducted by the past researcher. This is the first of its kind which primarily deals with identifying sources of content for developing digital libraries with special reference to India.

Barman and Singh (2004) analyzed the planning and managing aspects of digital library in Indian context. The scholars have noticed that the management and organization structures determine how the virtual libraries are managed, maintained and developed over a period of time. The study also revealed that the library professional should be equipped with specialized and enhanced skills that include in information technology. Funding for digital libraries should be ensured through various credible sources in order to sustain the progress of digital libraries. The researchers have suggested that the authorities of digital libraries must be careful in ensuring up-to-date and relevant information to the users.

Hanif (2005) investigated the status of resource sharing through networks in Punjab university libraries and observed that the advent of new information and communication technologies (ICT’s) had facilitated the networking of information for libraries, making them less dependent on maintaining large stocks of their own resources. The scholar suggested that infrastructure development, manpower
development, resource sharing and allied measures would improve the status of information management in Punjab university libraries.

Sreekumar and Sunitha (2005) examined the essential strategies for building practical digital libraries and electronic information system in a developing country like India. The scholars have shared their experience of creating a state of the art digital library information system by seamlessly integrating and aggregating print as well as the diverse distributed digital content of the Indian of Management, Kozhikode, India. They have used Greenstone software for developing the digital library of the institution concerned.

Jain and Babbar (2006) explored the digital libraries’ initiatives in India. The scholars discussed the problems and policy of the Government of India towards digital library development. They have categorized the different Indian digital library initiatives namely, at the governmental level, at academic institutions and within society level organizations. The study reveals that only sporadic and partial attempts have been made towards digital library initiatives in India.

Deb (2006) conducted a case study on the integrated digital library of The Energy and Resources Institute (TERI). The researcher primarily discussed the concept of hybrid digital library and the steps involved in its creation. The study explains that the hybrid digital library holds that metadata for accessing resources available in cyberspace and in the organization’s library. The study reveals that TERI integrated digital library provides a single window to promote access to born-digital resources as well as digitized documents.

Mahesh and Mittal (2008) carried out a review of digital libraries in India and examined the growth, development and current status of digital library initiatives in India as reflected through scholarly journals. The study reveals that most articles focus on developing digital libraries and digital collections except for a few studies on copyright issues and management of digital libraries. The authors have pointed out that no studies have touched upon issues such as digital rights management, security and digital library policies with reference to India. The scholars have suggested that amendment to copyright legislation is required to suit the changing needs of electronic environment in India.
Benine et.al (2008) evaluated the metropolitan library system, personnel and operations and noted that the Central Library and the branch libraries had made significant efforts to ensure both physical and web accessibility in their services. The scholars suggested that special service such as book-delivery service, the ICT training for the blind and the special user education programmes for disadvantaged and dyslexic children and other users in modern society.

Sridhar (2009) assessed the implications and issues of ICT developments on fiscal management in libraries and noted that the growth of ICTs and advent of e-commerce had resolved some long pending fiscal management problems of libraries. The scholar suggested that adoption of new technologies and e-procurement and consortia payments required management's positive support.

Patillo et.al (2009) analyzed the job autonomy among public and academic librarians and noted that there were significant differences in perceived autonomy based on areas of responsibility. The scholars suggested that library administrators should strike a balance between authority and autonomy and provide functional autonomy to the library professionals in order to facilitate better growth and development of libraries in modern society.

Shivaprasad et. al. (2010) examined the users’ attitude towards digital information resources and noted that engineering college teachers use digital information resources for academic purposes. The study revealed that digital information resources have become the vital part of modern professionals in Indian society. The scholars suggested that professional librarians should be enabled to plan and develop digital information resources in providing modern services to the users.

Mohamed et.al (2010) investigated the role of ICT policy from the point of view of sustainable development and observed that ICT policy was critical for leveraging knowledge for sustainable development. The scholars further noted that ICT policy ranked the least important compared to the other factors such as leveraging knowledge and national-specific knowledge management (KM) strategies. The scholars suggested that progress towards sustainable development requires a rigorous ICT policy, combined with strict regulations, to encourage Integrated Information and Communication Technologies Infrastructure (IICTI) investment, acquisition and usage.
Naik and Akshatha (2010) examined the technical inventions and their impact on digital library management and observed that full text delivery, end-user involvement and digitization of library services have become important components of modern virtual library management. The scholars have suggested that virtual libraries need strategic planning and development of cost-effective information technologies in order to provide high quality services to the users.

Arokyamary, R.J (2010) briefed the steps to develop digital libraries and has explained in detail the benefits of digitization.

Margolis (2011) explored the nature, scope and significance of digital library and observed that modern digital library environment put the young professionals in the perfect place in order to change the world. The scholar observed that library professionals should know more about children’s books than dedicated school and public librarians in modern society. The scholar suggested that great new books should be identified and made available to the users on the basis of authentic data and practical knowledge.

Naik (2012) evaluated the status, problems and prospects of digital corporate libraries in Karnataka and noted that a good number of digital corporate libraries have come into existence in Karnataka. The scholar stated that the future agenda must deal with the relationship between digital corporate library and corporate social responsibility. The study suggested that integrated efforts should be put forth by the top management, coordination committee, advisory committee, professionals and other personnel in order to strengthen the digital corporate libraries in Karnataka State.

Faizul Nisha,( 2013) conducted a study to access e-journal used among IIT Delhi and Delhi Universities users. The study revealed that e-journals are useful for building and updating knowledge and also for collecting relevant study and research materials. Access to e-journals is highly useful for not only retrieving information, but also to publishing research papers, manuscripts, assignments, presentation and seminars.
2.3 ICT Based Library Services

Wilson (2000) analyzed the needs, demands and responsibilities of new library institutions in the age of virtual environment. The scholar explored the need for rethinking library services for the new age and pointed out that libraries and librarians are required to provide qualitative, quantitative and competitive information services to the end users in order to achieve their goals.

Spangler (2000) investigated the process of digital library in India and pointed out that the kind of remote services offered by Bangalore Labs and others would be central to e-business everywhere in future in view of the tremendous growth of Internet and telecommunications networks in India. The study also revealed that Bangalore is one of the world’s top cities for technology development. The scholar has highlighted the emergence of India as a virtual power in the present times.

Witten et. al. (2002) examined the promise of digital libraries in developing countries and reported that digital libraries provided several innovative services and benefits to the mankind. The scholars observed that digital libraries should be managed on the basis of meaningful approaches which would safeguard the interest of information providers and information users. The study provides certain preventive and promotional measures for the improvement of digital library system in modern society.

Raju (2002) conducted a case study of CLIC from the point of view of creation of digital library for rural development in India. The scholar has reported that information explosion has brought about a new era of digital library in India and other developing nations. The study revealed that digital libraries could become effective instruments of rural development and provide the benefits of transparency, accountability and responsibility to the rural masses that are taken for a drive by the managers of rural development projects.

Parvathamma (2003) explored digital divide in India and emphasized the need for correcting the information inequity and injustice experienced by rural poor and backward sections of Indian society. The study focused on the social and economic factors responsible for digital divide in India. The scholar has suggested certain useful measures for bridging the digital divide in Indian society.
Hallmark and Lembo (2003) evaluated the reasons behind the selection of information oriented profession by the scientists and engineers in modern society and noted that a vast majority of modern libraries recruited qualified librarians who had scientific or technical backgrounds. The scholars suggested that constant on the job training and professional orientation programmes should be organized in modern libraries in order to improve the professional competence of library and information professionals in the new information environment.

Ally et.al (2003) studied the role of policy for proper and efficient library services in the electronic era and observed that contemporary librarians and policy makers were not subjected to systematic brainstorm. The scholars noted that new approaches in acquisition, accessing, selection, preservation and choices on whether to operate digital, or combine traditional print and digital resources in the library have to be worked out and adopted. The scholars suggested that policies which articulate libraries’ vision and mission should be formulated in order to facilitate proper electronic information resources assimilation in the libraries.

Benstead et.al (2004) assessed the alternatives to the mobile library service in providing a public library service to rural communities in England and observed that achieving social inclusion objectives was not satisfactory in the rural areas due to in built constraints and limitations. The study also reported that some authorities failed to consult users and non-users in rural locations. The scholars suggested that rural public libraries should be enriched in terms of infrastructure, technology, manpower, coordination and evaluation.

Bhattacharya (2004) analyzed the advances in digital library initiatives with a focus on a developing country perspective. The scholar traced the development of digital libraries with respect to India and reported that India’s attempt towards digital library development has been sporadic and partial. The scholar has divided the digital library initiatives into eleven categories that include art and culture, academic institutions, national level institutions, R&D organizations, government, NGOs, financial institutions, media, private, society and university levels. The study primarily deals with the policy of the government of India towards digital library development in India as well as the digital divide in general.
Armugam, Tangaraj and Shanti (2005) investigated the discovery of frequent access patterns in a digital library using association mining. The scholars mainly examined the concept of data mining and certain algorithms that can mine frequent user access patterns of the library database. The study primarily focused on the circulation or transaction database of an automated library rather than discovering frequent access patterns in a digital library.

Kaur and Singh (2005) examined the transformation of traditional libraries into digital libraries in India. The scholars noted that in developed countries 60% to 70% of information is available in digital format whereas in developing countries like India, this availability is 2.5%. The scholars highlight the need for a National Information Policy and for the training of library professionals to accelerate the transformation of traditional libraries to digital libraries in India.

Krishnamurthy (2005) conducted a case study of digital library services at the Indian Statistical Institute, Bangalore, India. The study reveals that the library professionals are required to work closely together to create open, distributed and publicly accessible information resources. The scholar suggests that digital collection development, close co-ordination and collaborative official structure would strengthen the foundation of digital libraries in India.

Abell and Wingar (2005) explored the role of commercial organizations in utilizing the ICTs for commerce and development purposes and noted that in the age of information revolution considerable opportunities for librarians and information professionals existed. The study primarily dealt with the basic features of the commercial information landscape relevant to librarians and information professionals, including: information supply; partnerships and information architecture. The scholars suggested that librarians and information professionals should be enabled to build their career on the basis of advanced training and orientation facilities.

Gorman and Reade-Fong (2005) presented a paper in the World Library and Information Congress, Buenos Aires, Argentina and examined the way in which non-governmental organizations (NGOs) utilized information and to some extent ICTs, for sustainable capacity building. The study addressed certain questions concerning the barriers to adoption of ICTs and emphasized that NGOs should collaborate with one
another in sharing development-related information in modern society in order to facilitate the empowerment of the people.

Ani and Esin (2005) evaluated the issues and challenges of globalization of library services in Nigeria in the new millennium and observed that inadequate funding/financial support of libraries, provision of relevant IT infrastructures, human resource/capacity building programme in ICT, uninterrupted power supply/backup, and user education in IT posed major challenges to the globalization of library services in the country. The scholars suggested that governments should give priority for extending financial support for libraries in order to develop ICT infrastructure and professional competence of library personnel.

Macgregor (2005) studied the nature of information management in the new millennium and observed that the nature of information in the twenty-first century presented the informatics community with new and difficult challenges. The scholar also noted that the informatics community created innovative models to accommodate information's inherent characteristics. The scholar suggested that understanding of the precise nature of information offered new perspectives on how the informatics community should view information in the twenty-first century.

Padmavati, Lal and Mahakuteshwar (2005) conducted a case study on CFTRI, Mysore, India which provided the digital version of theses and dissertations to the users. The study reveals that training programmes in the creation and management of digital libraries are essential to educate and impart skills to library professionals in order to make digital libraries sound and operational.

Hoskins (2006) assessed the status of school libraries which produced the new generation of information users in the age of information and communication technologies (ICTs). The study revealed that very few schools had well-resourced libraries with adequate ICT resources. The scholar suggested that teachers, researchers, students and other users should be encouraged to utilize ICT resources in modern academic libraries in order to widen their experience and enrich their capacity.

Sarrafzadeh and Hazeri (2006) analyzed the recent perspectives with reference to knowledge management of library and information professionals and reported that
increased awareness among LIS professionals contributed significantly toward effective knowledge management in modern society. The scholars suggested that modern libraries should focus on effective knowledge management and personality development of library and information professionals in order to utilize the advanced technologies and resources to the full extent.

Koganuramath (2007) presented an overview of digital libraries which provide a new way of serving the new generation users of the libraries. The scholar narrates purpose, features, functions, design and development of a digital library and virtual library environment with reference to India. The paper also enumerates the principles of development of digital library collection and various advantages. The work also includes a set of useful suggestions for effective management of digital libraries in a developing country like India.

Arendt (2008) investigated the barriers to adoption of ICTs in SMEs and noted that there was considerable gap between the SMEs and large corporations from the point of view of adoption of ICTs due to different financial status. The scholar argued that SMEs faced a digital divide mainly due to lack of access to information technology and inadequate knowledge, education and skilled owner-managers and employees within the enterprise. The scholar suggested that the actions aimed at bridging the digital divide in SMEs should concentrate on overcoming the skills access and usage access barriers within SMEs.

Fabunmi (2009) examined the challenges and prospects of digital libraries in universities in Nigeria and noted that library professional poses a serious challenge to the deliverance of services in the 21st century library. The scholar suggested that there is the need to review the LIS curriculum to facilitate the inclusion of the 21st century advancement to avoid churning out librarians with obsolete skills.

Voss and Procter (2009) explored the virtual research environment with reference to scholarly work and communication and noted that scholarly communication evolved in response to the opportunities these new tools open up and the challenges they raise. The scholars suggested that new scientific methods should be used in order to carry out interdisciplinary nature of research in many domains. The study also emphasized the need for the integration of virtual learning environments within library information services.
Ghosh (2009) carried out a case study on the digital infrastructure and attitudes towards access and sharing in selected engineering libraries in Maharashtra and pointed out that the structural, financial and technical factors that had compelled the academic libraries to think about the formation of statewide consortia. The scholar suggested that regional consortia should be formed in order to enhance the access to information and knowledge through cooperation for benefit of the engineering communities.

Adebisi (2009) evaluated the availability, usability and resource sharing co-operatives engaged by the Federal Polytechnic Libraries in South West geo-political zone in Nigeria and noted that there are adequate ICT awareness facilities but no effective resource sharing initiative among the Libraries. The scholar suggested that digitization and resource sharing would facilitate better access and utility of electronic information resources and services of polytechnic libraries.

Singh et.al (2009) studied the various aspects of the ICT use and applications in research and development institutions in India and noted that majority of the LICs of NOIDA have the basic hardware facilities such as servers, computers, printers, photocopier, Internet connectivity and so on. The scholars suggested that the hardware facilities in the majority of LICs should be properly utilized in order to provide user-friendly, speedy and efficient information services.

Nwezeh (2010) assessed the public relations tools and strategies adopted by the Nigerian university libraries and noted that library professionals were not good enough in the art of public relations. The study revealed that public relations professionals and librarians were not actively involved in developing mutually beneficial relationship between the university libraries and information users. The scholar suggested that the library professionals should be trained in the art and craft of public relations in order to market the library resources and build sound image.

Yusuf and Nkiko (2010) analyzed the involvement of non-professionals in cataloguing in Nigerian academic libraries and observed that the involvement of non-professionals in cataloguing was found in the academic libraries. The study revealed that changes in cataloguing practices which comprise online cataloguing, cataloguing of Internet resources and electronic files, copy-cataloguing, different metadata structures, introduction of OPAC and the involvement of non-professionals in
cataloguing practices. Outsourcing, procurement of ICT, employment of Systems Engineers as part of library staff, attendance of workshops and conferences among others were some of the strategies adopted to cope with these changes. The scholars suggested that academic libraries should concentrate more on building the capacity of library professionals in the application of ICTs.

Ifijeh (2010) investigated the relationship between information explosion and university libraries in China and observed that information explosion posed challenges to acquisition, cataloguing, classification and reference services in university libraries. The study revealed that information explosion provided users with an opportunity to select from a wide range of resources in the competitive professional environment. The scholar suggested that subject specialization among librarians, library cooperation, outsourcing, and use of ICT as strategies for intervention in future in order to improve the state of affairs.

Wawire and Messah (2010) examined the challenges faced in establishing university libraries in Kenya and pointed out that the private and public university libraries had gone through an era of renaissance in the field of education during the last two decades on account of remarkable information revolution. The study revealed that the competitive business and professional situation had made university libraries operate in an environment of tightened financial constraints. The scholars suggested that university libraries should be equipped with the state of the art infrastructural facilities and trained manpower in order to cope with the challenges of modern society.

Gnanalet and Ramakrishnan (2010) explored the effectiveness of multimedia programme in teaching environmental education and pointed out that knowledge of ICT and skills to use ICT in teaching – learning has gained immense importance in modern society. The scholars suggested that conventional method of teaching should be replaced by virtual method of teaching in order to develop the capacity of present generation of learners.

Harish Kumar, Bibhash Kumar and Kulshrestha (2010) in their study on using blogs for extending library services have examined the various types of blogs that are useful for information dissemination. The state that blogs are quick solutions for moving library collections and services into Web 2.0. The study explains in detail
how librarians can make use of blogs and extend value added services to their users. They conclude stating that blogs not only make the librarians to stay informed and to disseminate information but also makes publishing easy.

Bertot (2011) evaluated the status of digital library services in United States and noted that there have been significant efforts to develop digital libraries. The study reported that these efforts, however, largely focused on the building of the technology, telecommunications and standards (i.e., metadata) infrastructures that enable digital libraries to function technically. The scholar further observed that recent efforts include the building of digital content that populate digital libraries. The scholar suggested that policy makers and professionals should give more importance to development of digital library initiatives - particularly those funded by national and international agencies.

Dorcas Ejemeh Krubu (2011) study on the impact of ICTs in Nigerian Universities reveals that ICTs have changed the form of library collection, development strategies, building and consortia. ICTs have brought in changes in academic library activities like OPAC, reference services, user services, bibliographic services, audio-visual services, etc. The emergence of internet and ICT tools have changed the role of LIS professionals from intermediary to facilitator. The study concludes stating that the Nigerian universities have experienced certain obstacles and hindrances in the effective and efficient application of the ICT resources.

Akhtar Hussain (2013) investigated the use of ICTs and the ICT based library and information services extended in B Schools in Delhi and NCR region and studied the various aspects of ICT based library facilities, Internet usage, search engines, problems faced by the users in using ICT based library and information services. The researcher found that the ICT based services were satisfactory regarding research work, online database services and IT infrastructure facilities and also suggested for better services.

2.4 ICT Resources in Libraries

Norman (1997) assessed the impact of electronic information sources on collection development with reference to 15 academic libraries, primarily in the Midwest. The key aspects of digital libraries namely, materials budget, collection
development policies, licenses, identification, evaluation, selection, training, resource tools, electronic materials and so on were primarily examined by the researcher. The study highlighted the need for a collection development policy for electronic information sources in particular. The researcher suggested that collection development librarians need proper orientation and training in order to deliver goods effectively in academic libraries which are becoming virtual realities.

Obi (1998) studied the maintenance of an information literacy environment in a multi-cultural society and noted that inadequate infrastructure, financial resources, professional collaboration and other factors impeded the progress of electronic information management in modern society in the study area. The scholar suggested that advanced information literate environment should be created in Papua New Guinea in order to make use of the new information technologies and resources for knowledge development.

Hirshon (1999) analyzed the role of library consortia which is important to understanding the trends that are affecting the client base. The scholar explored two interconnected approaches to solve the practical problems of library consortia. The study suggests that change management, innovative technology, Website development, hiring and retaining staff and other progressive measures would boost library consortia.

Okerson (1999) investigated the electronic collections development in modern digital libraries and reported that most of the scholarly communications were made available to the mankind through electronic journals all over the world. The scholar has pointed out that digital libraries have come to stay in the modern society and the organizers should pool financial, intellectual, human and technical resources in order to enrich the status of digital libraries in modern society.

Sawhney (2000) examined the new markets for IT products in the age of information revolution and reported that information technology are impacting society in a significant way. The scholar observed that the information age is a concatenation of inventions that meet the criteria of causing an alteration in the balance of power with respect to virtual environment. The study suggests that libraries need to harness their assets – stakeholders, information and technology in order to compete and survive in the new economy.
Marcella and Baxter (2001) explored the information and library resources on a virtual campus with reference to United Kingdom. The research paper provides a critical overview of the introduction of the postgraduate Diploma/ Master of Science course in information and Library Studies, in online distance learning more, by the Scholl of Information and Media at the Robert Gordon University in Aberdeen. The study reveals that electronic communication and personal interaction were the important tools of distance learning. The scholars have suggested useful measures for the development of virtual campus which would benefit the present generation of learners.

Brenneise and Marks (2001) conducted a case study on creating a state wide digital health library with reference to Michigan Electronic Community Health Information Initiative. The study reports that the institute concern had the benefit of access to major and complete sources of high quality health information. The study suggests that enhancement of stakeholder identification and analysis would make the digital health library sound professionally and practically.

Geisler et. al. (2002) evaluated the benefits and implementation issues concerning the virtual collections in digital libraries with reference to United States. The scholars reported that digital libraries have potential to not only duplicate many of the services provided by traditional libraries but benefit both the library’s users and contributors and increase its viability. The scholars have suggested certain measures for enhancing interoperability and sharing across digital libraries such as those that are part of the National SMETE Digital Library.

Rajashekar (2002) made a comparative analysis of the J-Gate and Indian e-journal portal initiative for international journals with special reference to Indian users. The scholar reported that new electronic journals have added a different dimension to the process of learning in the present age of information revolution. The study provides useful tips for the effective management of e-journals in Indian setting in order to cater to the needs of ever increasing end users.

Zainab et.al (2002) studied the relationship between knowledge databases and virtual environment in Malaysia and pointed out that ICTs were seen as the enablers and not the sole instrument of an information rich society. The study reported that the Malay society was not ICT illiterate and was fully aware of the relevance of ICTs in
modern society. The scholar suggested that government and citizens should work together for the development of virtual environment of in Malaysia and protect the interest of users of information.

Arora (2003) assessed the possibility of strategic cooperation for consortia based access to electronic resources with reference to Indian National Digital Library of Engineering Science and Technology. The scholar analyzed various licensed e-resources and suggested suitable electronic collection which would enable the repository containing different content types ranging from research papers, reports and newspapers. The scholar observed that digital libraries are playing a lead role in the creation of institutional repositories supporting the cause of open access.

Joint (2003) made a comparative analysis of traditional and advanced information resources and services and pointed out that cataloguing and indexing, formed the bedrock of knowledge for many LIS professionals. The study further reported that the skills required in the digital library context were more heterogeneous, fluid and fast-changing. The scholar suggested that library professionals require a different training philosophy in the age of digital library.

Wallace (2003) conducted a case study of business information provision within Norfolk Library and Information Service (NLIS), UK and pointed out that increasing competition between the resources needed for business information provision and those needed for other priority areas enhanced the status of rural information management in UK. The scholar suggested that librarians and information professionals should be encouraged to develop profound skills in the use of electronic resources and CMEs must be made aware of the potentially rich resources that are currently being under-utilized.

Jain (2003) analyzed the digitization and networking with reference to research institutes libraries in India. The scholar conducted a survey of 25 institutions of the Indian Council of Social Science Research (ICSSR) which reveals that digitization and networking is taking place in social science libraries in India but in a rather slow manner. The scholar has pointed out that science and technology libraries are better off than social science libraries from the point of view of digitization.
Munshi (2003) conducted a case study which explored the possibilities of building digital resources by creating facilities at Indian National Science Academy (INSA). The scholar pointed out that the growing acceptance of digital media has resulted in libraries buying and providing excess to Internet resources, acquiring CD-ROM based data sets and providing services for standalone or networked CD-ROMs environments and digitizing documents.

Collinson and Williams (2004) carried out a review of the Southampton Institute Library which has developed Websites that are easy to navigate by both new students and experienced researchers. An alternative library navigation system was added to the more traditional library home page to provide students with a different way to explore and discover the wide range of information resources. The study makes useful suggestions for the development of alternative library system in modern society since it is more user friendly than more mainstream design.

Crawford and McLelland (2004) investigated the awareness of the students about Internet and other electronic information resources and observed that most of the pupils were not aware of the advanced electronic resources due to lack of orientation programmes. The scholars also pointed out that the organizational readers did not consult the library professionals before designing electronic information management in the study area. The scholars suggested that school library should be designated as one of the schools centers for ICT advice and teachers should be encouraged to enhance their ICT expertise for the benefit of pupils learning through proper training programmes.

Munnolli (2004) conducted a case study on organizing digital information base by using open source software with reference to corporate sector in India. The study reveals that there is great amount of interest in creating digital libraries especially in public sector. The scholar has suggested that the creators of digital library have to be knowledgeable about all aspects of digital library creation and management.

Iweha (2005) examined the electronic information resources utilized by the Obafemi Awolowo University in Nigeria and pointed out that inadequate electronic resource, improper orientation programmes and inadequate financial resources were responsible for the existing sorry state of affairs. The scholar suggested that
infrastructure development, assessment of the needs of the users, inter-library collaboration, delivery of need based services and scientific evaluation of electronic information resources and services would improve the process of information management.

Bennett and Landoni (2005) explored the current state-of-the-art in e-books and noted that modern generation of users were aware of the potential usefulness of e-books. The study further revealed that e-book suppliers followed certain marketing strategies for popularizing the benefits of e-books across the world. The scholars suggested that both the research and commercial development communities have to address certain major issues and design user-centered paradigm in order to establish better and stronger links with all stakeholders.

Hod and Kannappanavar (2005) evaluated the use of e-mail by the library and information professionals in India for personal and professional purposes and observed that e-mail services were used for multi-purposes by the professionals. The scholars suggested that the library professionals should be encouraged to use electronic mail effectively for both personal and professional purposes.

Krishnamurthy (2005) studied the digital library of Mathematics using D-Space. The scholar basically conducted a case study outlining the practical issues and key stages involved using D-Space with reference to digital library management in India. The study provides useful insight into the digital library initiatives and elaborates the importance of open source software.

Sutradhar (2006) conducted a case study on the design and development of an institutional repository at the Indian Institute of Technology, Kharagpur, India. The scholar provides relevant norms and guidelines for the design and development of and institutional repository which suit the Indian context in general and professional environment of IIT, Kharagpur in particular. The study provides professionally useful basis for the adoption of the tenets of digital library creation such as use of digital library software, standardized metadata and digital collections management.

Kumar and Kaur (2006) assessed the Internet use by teachers and students in engineering colleges of Punjab, Haryana and Himachal Pradesh and noted that Internet was widely used by the teachers and students since it was better means of
dissemination of information when compared to the conventional documents. The scholars further observed that the Internet had become a vital instrument for teaching, research and learning process of the respondents. The scholars suggested that user friendly mechanisms, feedback collection and up gradation of information resources and services would improve the academic and professional status of the students and teachers of engineering colleges.

Islam and Rahman (2006) analyzed the scenario of growth and development of ICT in Bangladesh on the basis of documentary sources and direct observation and noted that a developing country like Bangladesh needed a special information infrastructure in order to cater to the information needs of users representing different walks of life. The scholars suggested that modern libraries should have state of the art facilities, advanced tools, specialized manpower and tested techniques in order to increase the efficiency of electronic information services in Bangladesh.

Haneefa (2006) investigated the ICT infrastructure in special libraries located in Kerala and observed that all the special libraries of Kerala used latest information and communication technologies. The study further revealed that ICT based resources and services did not reach the users to the expected extent due to certain practical constraints and limitations. The scholar suggested that special libraries in India should develop strategies and policies that could make better use of ICT based resources and services.

Anuradha and Usha (2006) examined use of e-books in academic and research environment with reference to Indian Institute of Science, Bangalore, India. The study reveals that the students tended to use e-books more often-than faculty members and staff. The users of the e-books mostly used reference and technical material in particular. The study suggests that e-books should be procured by the virtual libraries according to the needs and demands of users.

Anuradha (2007) conducted a case study on design and development of institutional repositories for the Indian Institute of Science, Bangalore. The study reveals that there are about 40 software packages for creating Open Archive Initiative data bases but Greenstone Digital Library software is chosen for developing the institutional repository over there. The study provides useful tips and guidelines for meaningful design and development of institutional repositories in Indian context.
Iweha (2007) explored the utilization of electronic information resources in Nigerian university libraries and noted that ICTs had become basic ingredients in the operations of libraries, and the education sector in general. The scholar suggested that university libraries should subscribe more electronic information resources in order to avoid the constraints and limitations of traditional information resources in the age of virtual library.

Adeyoye (2008) conducted a case study of automation project of Igbinedion University of Nigeria and observed that the actualization of a full automated library system faced several challenges such as non-availability of fund, erratic power supply, inadequate professional librarians, lack of Local Area Network (LAN), choice of software and absence of maintenance and support agreement. The scholar recommended that university management should as a matter of urgency provide fund to facilitate full automated library system in the university concerned.

Nicholas et. al. (2008) carried out a landmark survey with reference to e-book usage in UK scholarly environment and reported that e-book penetration is very strong in the study area. The scholars presented the results of the biggest survey of its kind ever conducted which facilitates advancement on the knowledge of e-book use in modern society. The study reveals that the students used a wide range of information resources to support by learning and the online course materials provided useful knowledge and experience to the users.

Ameen, K (2008) evaluated the barriers to collection sharing in the Pakistan university libraries and noted that various technical, procedural, psychological and behavioral barriers in achieving planned and meaningful collection-sharing (CS). The scholar suggested that modern libraries should explore new possibilities, opportunities, and challenges of CS in the emerging paradigm.

Aharony (2009) studied the relationship between the librarianship and information science, focusing specifically on tagging and folksonomies and observed that professional LIS blogs reflected the most up-to-date interests of LIS professionals as well as bloggers' personal lives and experiences. The scholar suggested that information scientists should be encouraged to manage modern libraries in order to bridge the digital divide and facilitate optimum utilization of information resources and services.
Dala (2009) studied the role of information and communication technology in academic libraries with special reference to the achievement of millennium development goals in Nigeria. The scholar identified the various information and communication technologies found in the academic libraries and noted that academic libraries did not receive adequate funding to support their day to day activities. The scholar suggested that mobilization of adequate financial resources would facilitate better information and communication infrastructural development in the academic libraries. The study also suggested that professional librarians should be provided constant training and orientation in order to live up to the expectations of users in the modern competitive times.

Jange (2009) analysed the complex information needs of the society and for better accreditation from National Accreditation and Assessment Council (NAAC), the library and noted that modern information centre played a greater role in building, developing, and disseminating information products by establishing Virtual Learning Resource Centre (VLRC). The scholars emphasized the role of library managers in developing a strong ICT infrastructure in rendering Internet and E-communication services for optimization of e-resources and tools and developing anticipatory needs of users like compiling web resource directory of interest etc.

Mirza and Mahmood (2009) carried out the content analysis of websites of 56 General University Libraries (GULs) of Pakistan on the basis of six major content categories which include general information, web OPAC, reference service, collection, circulation, and document delivery service/Inter Library Loan. The study revealed that web-based services in GULs of Pakistan were in their infancy. The scholars suggested that LIS professionals must recognize the significance of web-based library services and provide advanced web services to library users in higher educational institutions of Pakistan.

Chambers and Schallier (2010) assessed the possibility of establishing a library – domain aggregator in European research libraries and noted that the libraries did not follow appropriate strategies in order to facilitate the domain aggregators for museums, archives and audio-visual collections. The scholars suggested that European libraries should become the library-domain aggregator in order to enhance their resources, services and status.
Bijitha and Chinnaswamy (2010) analyzed the e-resources and e-services which provide library support for online learners in modern society and observed that modern learners have the benefit of access to a universe of digital information through information super highway. The scholars have suggested that reference service should be enhanced and supplemented with modern technologies in order to provide quick service to the users.

Adeleke and Olorunsola (2010) investigated the online cataloguing and classification tools and techniques in Nigerian libraries and pointed out that the librarians had developed a high level of awareness about the electronic information resources and services. The study revealed the need for continuing education programmes for cataloguers for effective use of the tools. The scholars suggested that intensive continuing education programmes should be implemented in order to teach the skills required for online operations and the provision of web-driven facilities in Nigerian libraries.

Harish et.al. (2010) explored the software infrastructure for academic libraries in digital environment and noted that digital libraries use variety of database management system ranging from relational and extended relational database management system to object – oriented database systems in Karnataka. The scholars suggested that professional librarians should be enabled to make use of digital library resources and provide access to information and knowledge to the community of the users.

Rao and Choudhury (2010) examined the computer infrastructure facilities and services at National Institute of Technology Libraries in India and noted that computer infrastructure played a critical role in the academic system for meeting teaching, learning and research needs. The study revealed that computer infrastructure facilities were good enough in the libraries concerned. The scholars suggested that development of trained and competent manpower would facilitate standardization of services in the institutions concerned.

Kongawad (2010) evaluated the e-resources for professional development and research and pointed out that e-resources provided diversified services to the mankind across different geographical locations and facilitated constant learning. The scholar
suggested that the World Wide Web would be a better place to accomplish research on many topics in future.

Jebamalar (2013) have examined the use of ICT based Resources and Services among the users of Arts and Science colleges in Tirunelveli, Tamilnadu and state that the ICT based resources and services are the vital part of the library services. The study reveals that students are positive towards the usage of ICT based resources and services in the library but have faced problems due to slow access / low speed of internet connectivity. The study has also found that search engine Google has got an higher response as the best search engine, as the students find the required information.

2.5 ICTs in Libraries

O'Donovan (1994) studied the threats, challenges and opportunities presented to librarians by the advent of the Internet in modern society and noted that difficulties in navigating and searching such a wide range of undigested data sources, as well as problems such as the reliability and quality of data; response times; copyright; and an increasing trend to multimedia mattered most. The scholar suggested that modern library professionals should be encouraged to adapt their knowledge and working practices swiftly.

Lowry (1995) assessed the possibilities of preparing for the technological future with reference to digital library. The scholar noted that library system and operations were subjected to revolutionary changes mainly because of information science and technology advancements. The scholar provided certain guidelines with respect to preparing grounds for the establishment and maintenance of digital libraries in future.

Awogbami (1996) analyzed the various factors associated with the development of digital library all over the world. The scholar observed that revolutionary scientific and technological innovations in the field of information would pave the way for the establishment of digital libraries throughout the world. The scholar suggested that digital libraries should be managed on the basis of appropriate norms, guidelines and practices in order to satisfy the ever increasing needs of the information users.
Garrod (1997) presented the profile of African libraries with respect to automation in Ghana, Kenya and Nigeria. The study puts the search light on the library automation which has become an important aspect of virtual libraries in modern society. The study also revealed that library automation was undertaken in African libraries on the basis of proper assessment of the needs of the end users.

Herring (1999) investigated the value of interdisciplinary with special reference to Internet and observed that the design of Internet search engines has become a systematic exercise which benefits digital library system in modern society. The researcher has felt that Internet search engines play a major role in providing electronic resources to the mankind in the present society.

Xiao (2000) examined the virtual reality environment with special reference to a project in Sterling C.Evans Library at Texas A&M University. The scholar observed three progressive developments in the use of tour as an instructional medium namely – ‘physical tour’, ‘Web virtual tour’ and the ‘virtual reality tour’. The report illustrates that panorama VR could be a powerful tour to combine the physical tour and Web based virtual tour into one, making it a more useful medium that allows navigating, viewing, reading, hearing and remote access.

Kendall and Eve (2000) explored the provision, delivery and impact of information and communication technology (ICT) training for community librarians in UK public libraries and noted that Internet posed certain problems of obtaining adequate samples from research point of view. The scholars suggested that pure 'research' or a pure 'training' project should be deliberately brought together so that the training events provided the research environment.

Ibegbulam (2000) conducted a survey to ascertain the opinion of library professionals on the role of information and communications technologies (ICT) in the provision of reference services in Nigerian Universities and noted that librarians accepted the fact that the use of ICT would make reference services easier and faster and would enhance its delivery and the functioning of inter loans. The scholar suggested that inter-library collaboration and inter-loan facilities would enhance the status of information resources management in Nigerian university libraries.
McDonald (2000) evaluated the growth and development digital libraries and observed that new technological changes and standardized approaches to human resources management would boost the status of digital libraries in the new age of information explosion. The study provides useful dimensions on the development of virtual library system in modern society.

Brophy et.al. (2002) studied the libraries without four walls and observed that modern information technological and scientific developments played a major role in the creation of digital libraries. The study revealed that external library connectivity involved many parties from leased-line providers, county information technology services to ISPs, to phone lines and wireless technologies. The scholars noted that modern libraries do not controlled a vast majority of their network based services and resources under the changed circumstances.

Galanouli and Nair (2002) assessed the need to integrate information and communications technology (ICT) into teacher education courses in the age of virtual environment and reported that present generation of service providers and service users needed to develop necessary skills and competence in order to achieve the goal of optimum utilization of electronic information resources. The scholars suggested that advanced information literacy programmes should be organized in order to change the mindset of the tutors and the students regarding the role of ICT in teaching and learning.

Sokvitne (2002) analyzed the aligning opportunities and technologies with reference to modern library system. The scholar studied the changing profile of libraries in the new virtual environment and called upon the policy makers and professionals to provide multi faceted and integrated information services to the end users. The study provides interesting guidelines for the enhancement of opportunities in the new virtual library system.

Harris and Wathen (2003) investigated the scope of bridging the digital divide in terms of equalizing access to information and communication technologies and observed that government - run health information services relied heavily on information and communication technologies (ICTs). The study also reported that three groups namely - health policy makers, public librarians, and rural women had a different perspective on how consumer health information should be delivered. The
scholars suggested that ICT-based health information infrastructures should be developed across the country on the basis of assessment of the requirements of the users and ground realities.

Gaur. R.C (2003) examined the current state of digitization in Indian management libraries. The scholar mainly focused on library automation and its facets rather than on digitization or digital libraries. The study highlights the status of library automation in the Indian management institutes libraries. The study reveals that the digital initiatives in these institutions were rather dismal as compared to developed countries.

Gulati (2004) explored the use of information and communication technology in Indian libraries and information centers. The study dealt with the development of state of the art ICT infrastructure in Indian libraries and reveals that special libraries are better equipped and involved in consortia and digitization programmes in the country. The scholar opined that the science and technology libraries are better situated than other libraries from the point of view of digitization.

Ramzan (2004) evaluated the extent of information technology (IT) utilization in libraries in Pakistan together with librarians' level of knowledge in IT and their attitudes toward IT in libraries. The study revealed that librarians were aware of the potential of IT and IT had a significant relationship with librarians' attitudes. The findings of the study also revealed that the level of IT utilization and the librarians' level of knowledge in technology are good predictors of librarians' attitudes toward application of IT in their libraries.

Chandrakar (2004) studied the Unicode as a multilingual standard with reference to Indian languages. The scholar primarily dealt with Unicode and the related technologies available for localizing Indian language materials. The study provides useful guidelines for the development of information technological base which would provide easy access to information resources available in Indian languages on various aspects of life and culture.

Ani et.al (2005) assessed the extent of adoption of information and communication technology (ICT) in university libraries in Nigeria and observed that only six university libraries were fully computerized, nine were partially
computerized and seven university libraries had installed local area networks. The scholars also pointed out that most of the Nigerian university libraries suffered from inadequate funds and the poor state of electricity. The scholars suggested that policy makers should develop the Nigerian university libraries network and academic libraries network.

Okiy (2005) analyzed the current state of information communication technologies (ICT) application for information provision in Nigerian university libraries and pointed that inadequate funding, electricity supply, competent manpower and maintenance of ICT facilities were responsible for poor application of ICTs in Nigerian university libraries. The scholar suggested that university libraries in Nigeria should take advantage of ICT facilities to provide information more effectively to their users through massive infusion of funds, constant electricity supply, greater commitment of university library staff to computerization efforts, training and retraining opportunities for librarians and cooperative acquisition of electronic information resources through consortia.

Ferreiro (2005) presented another paper in the World Library and Information Congress held at Buenos Aires, Argentina and observed that currently information and communications technology (ICT) had introduced radical changes in the way of producing and disseminating texts. The scholar suggested that modern librarians should be given necessary orientation for the meaningful application of ICTs in the management of information resources and services.

Ashcroft and Watts (2005) presented a research article in the World Library and Information Congress at Buenos Aires, Argentina and noted that the emergence of electronic information resources had created subsequent changes in the skills needed by information professionals. The scholars also observed that professional bodies and modern libraries were aware of and capable of using emerging information communication technologies, as well as having essential communication skills. The scholars suggested that modern libraries should have interface with professional bodies, such as CILIP in the UK and the ALA in the US in order to improve the status of digital reference services.

Malathy (2005) investigated the satellite technology based digital libraries in India. The scholar opined that Greenstone Digital Library (GSDL) is primarily
dependant on satellite technology which has revolutionized the concept and practice of digital libraries in modern society. The study reveals interesting findings with respect to adoption of satellite technology for the purpose of strengthening digital library system and operations.

Balakrishnan (2005) examined the future research directions of universal digital library in Indian context. The scholar reported that India is a major contributor to the million books to the Web project initiated by Raj Reddy of Carnegie Mellon University. The study reveals that the technological challenges with regard to the Indian languages and future directions including the possibility of creating a 21st century equivalent to the public library primarily depended on the creation of creative and competitive Web contents.

Sami and Pangannaiah (2006) carried out a literature survey on the effect of information technology on library users in order to understand the problems encountered in their information technology usage. The review article provides interesting findings which reflect the problems encountered by a range of users in different countries. The scholars have pragmatically provided certain factors to be considered in designing a training module with reference to professionals associated with physical and virtual libraries.

Singh (2006) explored the application of the information and communication technology in the libraries and information centers of the DRDO and the CSIR located at Delhi. The study revealed that modern research and development organizations in Delhi adopted advanced technological tools and techniques in order to provide round the clock information services to the scientists, technocrats, academicians, researchers, students and other users. The scholar suggested that inter-library collaboration would enhance the status of delivery system in modern libraries.

Omekwu (2006) evaluated the role of librarians in the age of ICTs and stated that revolutionary changes and developments in the field of ICTs brought about a remarkable shift from information to knowledge processing. The study further revealed that Internet usage status and information and communication technology facilities in Africa were not on par with the developed countries. The scholar called upon the policy makers and professionals to provide authentic and reliable
information, evolve strategic alliances, participate in network activities and contribute to the bridging of the digital divide.

Durrani (2006) studied the progressive librarianship in Africa with special reference to Progressive Librarian and Information Activists' Group (PALI Act) and observed that the act had a vision of a people-oriented information service capable of meeting the information needs of industrial and agricultural workers. The scholar suggested that the modern libraries should have information and communications technology (ICT) resources and effective leadership development programmes in order to march towards sustainable institutional development.

Adeleke and Olorunsola (2007) assessed the use of ICT by cataloguers at a private university library in Nigeria and reported low level of ICT literacy in libraries over there. The scholars suggested that the policy makers and organizational leaders should address the desired level of ICT literacy among their librarians. The study also provided useful norms and guidelines for the implementation information literacy programme and capacity development programme in the Nigerian university libraries.

Seymour (2007) analyzed the management information technology in academic libraries and observed that modern schools and colleges did not organize adequate orientation programmes in order to develop their competency in applying information literacy skills. The scholar suggested that modern educational institutions should have well organized and equipped academic libraries in order to provide the appropriate electronic information services to the present generation of users.

Haneefa (2007) investigated the application of information and communication technologies (ICT) in special libraries in Kerala, India and pointed out that ICT-based resources and services were not reaching the users to the expected extent on account of certain policy and financial constraints. The scholar proposed a variety of measures of formal orientation and training on ICT in order to make the present generation of information users to become more effective users.

Adekunle et.al (2007) examined the attitude of selected librarians in Ibadan, Oyo state, Nigeria toward information communication technology (ICT) and observed that some librarians in Africa put forth serious efforts in order to bridge the digital
divide in modern society. The scholars called upon the librarians in Africa to rise to the challenges posed by ICT and to help bridge the digital gap.

Somerville et al. (2007) conducted a case study on the implementation of modern strategies in the age of ICTs and observed that modern libraries had adopted latest technologies and techniques in order to satisfy the changing information needs and demands of users. The scholars suggested that modern academic libraries should implement information literacy programmes and develop the capacity of library professionals in order to live up to the expectations of the users.

Dhanavandan et al. (2008) explored the use of ICT tools by librarians in the new virtual environment and noted that modern ICTs have provided libraries with new opportunities to improve their resources and services. The scholars suggested that librarians should be encouraged to make use of ICTs and enhance the status of information management in modern libraries.

Majid and Haider (2008) evaluated the perceptions and stereotypes associated with the library and information profession in order to determine whether the public image of library professionals had improved with the extensive use of ICT. The study revealed that library users in Singapore did not have a flattering image of librarianship and perceived the status of librarians to be low as compared to certain other professions. The scholars have offered certain suggestions for improving the image of library and information professionals in society.

Lor and Britz (2008) studied the challenges of modern libraries in the context of knowledge society and observed that remarkable changes in the application of new communication technologies had brought about a knowledge society. The study further revealed that new information and communication technologies have brought about the globalization of knowledge in the new millennium. The scholars suggested that modern library professionals should be encouraged and motivated to facilitate meaningful application of new technologies in their day to day operations.

Marimon (2008) carried out a bibliographical review in order to explore the possible impact of demographic ageing on libraries. The study revealed that the ‘baby boom generation’, had better education, improved ICT knowledge and gained better physical health than the generations preceding them. The scholar suggested that
design of quality library services for the new retired people would facilitate better health management through intervention new communication technologies.

Badke (2009) assessed the relationship between media literacy, information and communication technology (ICT) and noted that media literacy focused on evaluation and analysis, such as understanding the messages embodied in advertising, handling excesses of sex and violence, and preventing propaganda. The scholar suggested that modern libraries should develop adequate electronic database and provide user friendly information resources and services.

Omoniyi and Akinboro (2009) analyzed issues concerning the need to re-designation of librarianship to enable university libraries in Nigeria cope with challenges that Information and Communication Technologies (ICTs) have posed in modern society. The study revealed that many library staff lacked ICT skills required for effective performance of jobs. The scholars suggested that inclusion of more ICT courses in Library Science curriculum, training of library personnel, development of ICT learning infrastructural facilities and other measures would improve the state of affairs in Nigerian university libraries.

Bygstad et.al (2009) investigated the impact of semantic web technology on the strategic, organizational and technological levels and pointed out that there was a considerable gap in semantic web research between the contributions in the technological field and research in the organizational field. The scholars suggested that inter-organizational and cross-organizational structures have to be established in order to address the problems of ontology engineering in modern society effectively.

Omekwu and Echezona (2009) examined the challenges and opportunities for librarians operating in a global information environment on the basis of an exploratory research design. The study revealed that the critical challenge for information professionals from developing countries was to harness technological systems to globalize their information resources and services. The scholars suggested that modern library professionals should enable to acquire skills that will make global professionals rather than local champions.

Kumar and Biradar (2010) explored the use of information communication technology (ICT) in 31 college libraries in Karnataka, India by investigating the ICT
infrastructure, current status of library automation, barriers to implementation of library automation and also librarians' attitudes towards the use of ICT. The study revealed that application of ICT in Indian college libraries had not reached a very high level due to lack of budget, manpower and training facilities. The scholars suggested that modern libraries should provide extensive and appropriate training to the library professionals in order to make use of ICT tools.

Nkanu and Okon (2010) evaluated the digital divide in Nigerian society and pointed out that the widening imbalances of access to ICT had resulted in inequitable access to ICTs and other internet-related technologies associated with the provision and use of information services in Nigerian libraries. The scholars stated that these imbalances have implication for quality information service delivery in Nigerian libraries. The scholars suggested certain measures to address the digital divide problem in Nigerian libraries.

Kuriyan et.al (2010) conducted an extensive review of literature on information and communication technologies (ICTs), development and trust and observed that trust was a broadly defined, yet relatively understudied concept in the context of ICTs and development. The scholars suggested that trust in information and trust in institutions that are often key providers of these services. The study further highlighted the key programmatic areas in which research on this topic can be applied.

Kaur and Preeti (2010) studied the role of technological innovations in improving library service and noted that the present generation of information users relied more upon electronic resources and service which were widely accessible to them across the world. The study revealed that library professionals were not fully equipped by their organizational leaders in order to cope with the challenging circumstances and increasing demands of the users. The scholars suggested that modern libraries should give high priority for infrastructural development and manpower development.

Ejedafiru (2010) assessed the role of ICTs in the academic library and noted that adoption of ICTs paved the way for progress in resource sharing and research. The study revealed that Nigerian libraries could not meet needs of users because of a poor economy and lack of ICT infrastructure. The scholar suggested that academic
libraries should be equipped with latest infrastructure, technology, manpower and strategies in order to facilitate constant sharing of knowledge, experience and expertise.

Pastula (2010) analyzed the utilization of ICTs by the distance educational beneficiaries and noted that emergence of new information and communication technologies brought about the interactive learning in modern society. The scholar suggested that Webpage technology should be developed in order to provide the benefit of interactive tutorials across the world and enable the students to achieve success in the field of higher education.

Batool and Ameen (2010) conducted a case study on the status of technological competence of the university librarians in about 8 universities of Pakistan in terms of the main categories of T-template namely - computer hardware, word processing, internet, troubleshooting and ILS (integrated library system) expertise. The study revealed that participants were proficient enough in basic computer skills and were able to computerize their library collections. The scholars suggested that computerized acquisition and circulation systems should be upgraded in order to enrich the professional competence of librarians in Pakistan.

Ramesh (2010) investigated the digital libraries on the Internet and observed that Internet and the Web have grown in leaps and bounds over a period of time and accelerated the problem of information explosion. The study reported that the web has been considered by many as the worlds’ ultimate virtual library. The scholar suggested that SEs necessitate a huge organizational effort and provide the user quick information in modern society.

Sadappa and Siddaramaih (2010) examined the advances in networking and communication technology in information sharing and observe that merger of computer and communication technologies have emerged as networking. The scholars suggested that modern managements should provide access to global e-resources including multi - media based educational content through networking of colleges and universities.

Saleem, A and others in their study application and uses of ICT in Academic Libraries examined the uses of ICT tools in academic libraries and how they have
been applied to provide innovative library services to users. They found that academic libraries lack LAN facilities, resulting in less usage of internet and video conferencing.

### 2.6 ICT Skills of LIS professionals

Simmons (1983) explored the role of teacher-librarians with regard to the educational use of computers and pointed out that computer literacy development programmes were seriously considered by modern libraries. The scholar suggested that computer skill, communication skill and managerial skill should be developed in the librarians in order to facilitate maximum utilization of new electronic resources and services.

Frank (1989) evaluated the availability of education for librarians in major engineering colleges and noted that training programmes enabled the librarians to provide bibliographic assistance in a science engineering library. The scholar stated that library schools should make more efforts to recruit students with science or technology qualifications. The scholar suggested that library professionals should be enabled to develop computer literacy, communication skill and leadership quality in order to do absolute justice to their role in the modern information society.

Ovens (1991) studied the computer literacy in libraries and observed that modern libraries acquired latest information technologies, resources and software in order to cater to the needs of users. The study also revealed that most of the librarians had come forward to make use of computer literacy programmes in order to survive in the age of virtual environment. The scholar suggested that institutional communication, orientation programme, computer literacy development and inter-library collaboration would improve the status of modern libraries.

Aina (1994) analyzed the computer literacy among the librarians in developing nations and noted that computer literacy was widely accepted as an essential part of the elementary education of an average citizen in most developed countries and emphasizes that the library profession required knowledge of computer science. The scholar suggested that libraries should provide adequate resources and opportunities for the development of computer literacy among librarians.
Poulter et al. (1994) investigated the role of modern library and information science professionals as knowledge engineering forces and noted that library and information science professionals had fared as knowledge engineers in modern society. The scholars suggested that advanced tools and techniques of knowledge engineering should be utilized by the professionals in order to achieve better professional progress and satisfy the needs of information users.

Chen (1996) examined the new tasks and opportunities for libraries in the digital environment and observed that future generation of librarians should equip themselves with necessary professional skill, competence and leadership qualities. The scholar primarily dealt with the roles and responsibilities of library staff with respect to successful management of virtual libraries.

Klemperer and Chapman (1997) explored the role of digital libraries in modern society and stated that the digital library staff should acquire more ICT-know-how and develop professional competence. The scholars have pointed out that users, suppliers and other stakeholders influence electronic library development. The study highlights the human factors in developing electronic library services in the new age of information revolution.

Garrod (1997) evaluated the role of human resource management in digital libraries and pointed out that human factors are crucial in creating the environment in which electronic services can be effective and sustained. The scholar suggests that digital librarians should develop new roles in the electronic age as advisers and navigators through the maze of information available electronically. The study primarily deals with human resource management with reference to digital libraries.

Jokiae (1997) studied the possibilities of formal education of library and information science (LIS) professionals in the Republic of Croatia and noted that qualified, specialized and competent information professionals were recruited in the study area. The scholar suggested that library and information professionals should be enabled to upgrade their professional skill, leadership and competence constantly by the builders and managers of modern libraries.

Morgan (1998) analyzed the computer literacy for librarians and pointed out that librarians usually had to accomplish the specific computing tasks of editing text,
organizing text and disseminating text. The study dealt with the accomplishment of certain tasks through the use of text editors and word processors, spreadsheets and databases; and local and networked services. The scholar suggested that computer literacy development programmes should be organized by the modern libraries in order to enhance the status of information management and utility.

McDonald (1998) investigated the human factors in digital library management and pointed out that institution builders should concentrate more on developing human competence apart from building the state of art infrastructural facilities in digital libraries. The study provides useful tips for effective management and development of digital librarians in the modern society.

Sridhar (1999) examined the skill requirements of library and information science professionals in the age of digital revolution and noted that Information technology had significantly affected the delivery of library services and the transition has not been altogether smooth. The scholar observed that in addition to their professional knowledge, library professionals now need to have some knowledge of areas such as management, languages and statistics, as well as IT and computers. The scholar suggested that information professionals must also be motivated to deliver services in the new media areas.

Saunders (1999) explored the human element in the digital library and pointed out that library staff should be enabled to learn the art and craft of information diffusion based on advanced technologies and tools. The study emphasized the need and importance of human resources development with reference to new virtual environment. The scholar provides useful guidelines for the promotion of human resources of digital libraries.

Reid (2000) evaluated the changing role of library and information professionals in the age of digital library and observed that the most radical innovation was that of the Internet and it may no longer be appropriate to think in traditional terms to exploit this new medium to the fullest extent. The study also revealed that Internet offered remote access and digitization programmes to the users. The scholar suggested that digital exhibitions should be developed with a greater emphasis on collaboration and interpretation, aimed at the non-academic or casual users namely – librarians, museum curators and archivists.
Dalton and Shoolbred (2000) studied the barriers to career development within the library and information services (LIS) profession and noted that professional segregation, employer prejudice, poor employment strategies, lack of confidence among LIS professionals, training and lack of professional support were the impediments to career development of library and information professionals. The scholars have offered a number of recommendations for employers, professional bodies and LIS professionals that may help to alleviate many of these barriers.

Sharpe (2000) assessed the ICT training for teachers and school libraries staff, librarians in Sunderland and noted that the institutions concerned pooled their expertise and delivered training through an interactive Web site. The scholar suggested that practical issues, financial support, manpower development, collaborative approaches and other measures would improve the status of electronic information services in the study area.

Dearstyné (2000) analyzed the future role and responsibilities of information professionals in the new virtual environment. The scholar pointed out that digital libraries have become an important component of modern information society and information personnel should change their work culture in order to do justice to their role in the new information environment. The scholar primarily dealt with the challenges and responsibilities of information professionals as strategists and leaders in the new virtual environment.

Gorman (2000) investigated the role of librarians in the 21st century especially in the virtual environment. The study reported that librarians are required to change their attitude toward digital library and develop professional competence in order to achieve the goals of digital library. The study suggests certain training and orientation parameters and practices for the enrichment of digital library management.

Sreenivasulu (2000) examined the role of a digital librarian in the management of digital information system in Indian society. The scholar has observed that the role of the traditional librarian needs to be re-examined in the light of new electronic information environment. The author made the pioneering attempt toward examining the role and responsibilities of ‘digital librarian’ and highlighted professional excellence, communication skill, leadership qualities and capacity building among the digital librarians.
Farha (2001) conducted a case study on an academic medical library in Lebanon and reported that the role of traditional reference librarian and the end-user education programs had to change to fit this borderless library. The scholar has suggested that reference librarian has to carry out a smooth transition to a virtual library and help users cope with the technological changes by obtaining suitable training which is presented in different forms such as orientation sessions, seminars and course related instruction.

Prytherch (2001) carried out an extensive review of literature on digital library skills, including knowledge and use of electronic sources and noted that more technical skills were required on various aspects such as imaging technologies, optical character recognition, markup languages, metadata, indexing and database technologies, interface design and programming in order to improve the delivery system and facilitate maximum utilization of electronic information resources.

Agha (2001) assessed the professional development specialization in modern libraries and observed that professional competencies were integrated into job descriptions and professional development goals. The study revealed that competencies were often used as a basis for training by converting competencies to learning objectives. The scholar suggested that modern LIS professionals should be enabled to develop the ability to control and operate the things in the intellectual environment.

Klugkist (2001) made a comparative analysis of virtual and non-virtual realities and noted the changing roles of libraries and librarians in the new environment. The study revealed that modern LIS professionals should be equipped with better skills and competence to handle new technologies and operations. The scholar suggested that virtual libraries should be managed by technically and professionally competent manpower.

Anwar and Al-Ansari (2002) explored the current continuing professional development practices, perceptions of academic library employers about skills that need to be developed in their staff in the six Gulf Cooperation Council countries and reported that a systematic staff development program was not available for the professionals in the study area. The scholars suggested that regular training
programmes and scientific evaluations would boost the status of information management in the modern libraries.

Ramaiah and Moorthy (2002) studied the changes in libraries and the expectations of their users which were related aspects of library and information science (LIS) training. The study reported that the impact of CEP courses organised by different agencies in the field of LIS varied from context to context. The scholars suggested that continuing education programmes should be strengthened on the basis of scientific evaluation and consultation of experts in the field.

Nwakanma (2003) presented a paper on the goal of future researchers in developing the professional competence of library and information professionals and noted that in the new virtual and economic environment professionally skilled and competent library and information professionals would survive and earn employment opportunities. The scholar suggested that advanced level of IT skills training is necessary for modern library schools in order to facilitate better employment opportunities.

Brine and Feather (2003) analyzed the skills used by library and information science (LIS) professionals and observed that evaluation of the participants indicated that the portfolio was a useful tool in the personal and professional development of LIS students. The scholars further noted that the appropriateness of the portfolio as a tool for continuing personal and professional development should be subjected to scientific evaluation by the future generation of researchers. The scholar also suggested that library professionals should be encouraged to develop information skill and professional competence in order to deliver the goods and services properly.

Samsuri and Yaacob (2003) studied the current practice of training teachers to take charge of the library in Malaysia and noted that the reengineering and the creation of new information programmes complied with the new demands of ICT. The scholars have suggested that adequate training for teacher-librarians would go a long way in improving the status of academic libraries in Malaysia.

Jankowska and Marshall (2003) assessed the social interaction between technical and public service librarians in order to enhance library services to the academic faculty and students during these demanding times of technologies and
information overload. The scholars pointed out that social interaction between librarians when the perpetuation of the traditional academic organizational model is not efficient enough for the faculty and students' need-driven use of information. The scholars suggested that rapid changes resulting from ICT demand constant social interaction that would be facilitated by establishing working teams for specific tasks.

Singh (2003) analyzed the emergence of library and information science (LIS) education in India before and after independence. The scholar also analyzed the current status, the different patterns, levels of LIS education and research programmes offered by various universities. The study revealed that a national level accreditation body to maintain uniformity and standards in LIS education was required in India. The scholar suggested that the problems affecting the status of LIS education should be solved by the LIS professionals in order to face the growing challenges of the job market.

Kigongo-Bukenya and Lutwama (2004) investigated the appropriateness of EASLIS curriculum to the professional practice in US fields in Uganda and noted that library professionals suffered from inadequate practical skills, the staff-student ratio was unmanageable and specialization through electives is inadequate. The scholars suggested that ICTs should be focused in the curriculum in order to enrich computer literacy and facilitate maximum utilization of electronic information resources and services in Uganda.

Paris (2004) reviewed the past studies concerning library and information centres in Malta and observed that growing need for professional training from library professionals had led to the appointment of fulltime library professionals in the university. The scholar suggested that need based, user-oriented and locally relevant information resources and services should be made available in various public libraries in Malta.

Virkus and Metsar (2004) examined the current trends and developments in higher education (HE) and noted that new educational paradigm has created the need for a re-conceptualization of the roles and responsibilities of librarians. The scholars suggested that effective partnership between library and faculty, integrated information literacy programmes, the integration of the potential of modern ICT and
the use of active learning methods would improve the status and efficiency of electronic information management in the higher educational institutions and libraries.

Okiy (2004) explored the training programme organized for non-professional and professional staff of the Delta State University Library, Abraka and noted that circulation duties, shelving and shelf-reading, collection development, reference and reserved book services, filing and card maintenance, cataloguing and classification, special collection services, computerization activities and library administration were not fully addressed by the policy makers. The scholar suggested that library professionals should be encouraged to develop computer literacy, information literacy and allied capabilities in order to race against the time from the point of view of electronic information resources management.

Monk (2004) evaluated the computer literacy programmes of UK public library workers and noted that all the library personnel were not given necessary training for the development of computer literacy. The scholar suggested that the IIC’s aim of getting all library staff up to the ECDL has not been realized. Furthermore, there has been a significant difference in terms of training between professional and front-line staff. The study also emphasized the need for enhancing the efficacy of such training programmes, especially in terms of financial incentives.

Bird and Tedd (2004) studied the role of the public library in encouraging reading and using ICT in the reading development process in UK and noted that all 22 public library authorities had considered the reader-development issues. The study revealed that reader-development programmes were undertaken in librarians in Wales and suggested that the changing needs and demands of the readers should be taken into account while designing electronic information resources management in the libraries of UK.

McMenemy and Poulter (2004) assessed the basic and advanced ICT skills for the new library professionals in Strathclyde University and noted that modern libraries were equipped well in terms of infrastructural facilities and man power. The study revealed that library professionals were not trained and motivated by the organizers on the basis of tested and tried methods. The scholars suggested that modern libraries should give top priority for the development of the professional skills
and competence of the librarians in order to satisfy the ever growing needs of modern users.

Ashcroft (2004) examined the explosive growth in the digital resources and services and noted that users and LIS professionals have gained technology abilities in order to achieve success in their academic and professional endeavors. The study revealed that open-source technology allowed technically proficient librarians to control and enhance the users’ experience.

Babini (2004) investigated the need and importance of training virtual library network’s staff using the Internet with special reference to Latin American and the Caribbean Social Science virtual library online course the study revealed that in the new age of virtual library institutional relationships were connected technologically and operationally. The scholar noted that integration of independent system, along with improved authentication and authorization services created a friendlier professional environment. The new environment also provided the users with ways to personalize and customize the library interface.

Chauhan (2004 ) analyzed the ICT enabled library and information services and noted that ICTs provided an opportunity to implement electronic networks and achieve the provision of access to remote computerized information oriented products and services much easier than before. The study revealed that modern libraries took the advantage of the facilities available on the Internet and integrated them into their daily operations to meet the changing needs of customers.

Nyamboga (2004) studied the information skills and information literacy in Indian university libraries and noted that academic libraries in India increasingly applied ICTs in the modern times. The study revealed that ICTs facilitated access to electronic information which has become invaluable and complementing traditional library resources. The scholar suggested certain strategies on how to overcome ICT problems in academic libraries.

Nyamboga (2004) examined the required skills of information technologies for library and information professionals with reference to university libraries in Kenya and noted that the role of ICTs in academic library and achievement of millennium development goals cannot be over emphasized. The study revealed that
application of ICTs in modern libraries has improved the information acquisition, processing, dissemination and storage. The scholar also noted that application of ICTs transformed the libraries from book centered to information centered institutions.

Bawden et.al. (2005) evaluated the education and training for digital librarians with reference to Slovenia and UK and noted that modern libraries in the study areas were actively linked through electronic networks of various types – local, regional and international. The study revealed that the organizational structure should be improved in the new electronic environment along with systematic manpower planning and development.

Rajalakshmi (2005) assessed the role of librarians / information professionals in 21st century and noted that ICTs and electronic networking required skilled manpower to install and network in the new virtual environment. The study primarily dealt with evolving a comprehensive plan for designing suitable course on application of ICTs for LIS professionals. The study revealed that the academic librarians of 21st century must be more dynamic since the professional environment has shifted from one that relied heavily on print sources to electronic formats.

Adeyoyin (2005) analyzed the levels of ICT literacy among library staff in a range of Nigerian libraries by following survey research method. The study revealed that a vast majority of the respondents were ICT illiterates. The scholar suggested that adequate ICT infrastructure development, manpower development, inter-library collaboration and scientific evaluation would improve the status of information management in modern Nigerian libraries.

Hoskins (2005) investigated the ICT knowledge, skills and application among the library professionals in South Africa and noted that the librarians used ICTs. The study for the revealed that librarians had low level of ICT knowledge and skill development due to inadequate training and orientation programmes. The scholar suggested that librarians should be equipped with professional skill and competence through formal training and orientation programmes.

Obajemu and Ibegwam (2006) conducted a study in order to understand the attitude of librarians towards the application of ICTs in Nigerian libraries and observed that the workshops organized in recent years had spurred the action of the
participants at those workshops to further pursue ICT to a great extent. The findings also revealed that the workshops have had positive impact on the participants with respect to the application of ICT to cataloguing and classification. The scholars suggested that Nigerian libraries should computerize their catalogues in order to cater to the needs of users.

Kanamadi and Vichare (2006) examined the information literacy programmes for social scientists in Indian universities and observed that social scientists were not encouraged by the policy makers and library professionals to apply ICTs for their research and developmental activities. The scholars suggested that modern librarians should be encouraged to play a major role in the implementation of information literacy programmes.

Regha and Rani (2006) explored the job psychograph of library and information science professionals in higher educational institutions of Tamil Nadu and noted that sincerity, clarity of thought, good interpersonal relationship and honesty were considered more important while teaching ability and emotional stability were considered less important by library and information science (LIS) professionals. The scholars suggested that morale boosting and career development oriented training programmes should be organized for the benefit of information professionals.

Belcher et.al (2006) evaluated the need and importance of ICT training for African university library professionals and noted that African librarians were generally happy with this training approach. The scholars suggested that African university library managers should organize suitable information literacy programmes for the benefit of academic staff and students in order to exploit the potential of the Internet and other advanced information tools and technologies.

Adeyoyin (2006) studied the information literacy among the personnel of West African university libraries and observed that more than 50% of them did not have the benefit of information literacy programmes. The scholar also pointed out that the study constituted about 15.97 percent for the literate paraprofessionals as against 84.03 percent for ICT non-literate paraprofessionals. The scholar suggested that library professionals should be encouraged to improve their information literacy status and professional competence in this age of virtual library.
Farkas (2006) analysed the skills for the 21st century librarians and observed that technology competency is the fundamental knowledge and ability that enables effective use of electronic resources and services to accomplish professional tasks. The scholar suggested that new generation of LIS professionals should be enabled to learn new technological skills and applications systematically.

Babu et. al. (2007) assessed the ICT skills among librarians in engineering institutions in Tamil Nadu and noted that contemporary LIS professionals needed to acquire ICT skills and competence in academic libraries. The scholars noted that LIS professionals in engineering institutions of Tamil Nadu need proper training and orientation on a regular basis in order to cope with the increasing professional challenges and demands.

Kumar (2007) investigated the information and communication technology knowledge and skills of librarians in the Chandigarh city libraries and noted that technically skilled and professionally competent LIS professionals are required in modern libraries. The study revealed that modern LIS professionals should possess standards and values that function effectively and smoothly in a changing technological environment.

Joint (2007) assessed the status and role of new generation of librarians in the age of virtual environment and noted that newly qualified and recruited professionals in the UK found good models for reshaping the UK profession by taking some of the best examples of professional association practice from the USA. The scholar suggested that new generation of information of professionals should be trained on ethical, legal, technological and professional aspects of information management in modern society.

Mahmood and Khan (2007) analyzed the need for ICT of library and information science (LIS) professionals and noted that LIS professionals showed their preferences in the areas requested and a series of recommendations are provided based on the findings from the survey. The scholars suggested that modern libraries should enable the librarians and other professionals to develop leadership quality in the new age of virtual environment.
Awale-Ale (2007) investigated the role of academic librarians as partners in promoting skills for entrepreneurial education in Nigeria and noted that many universities experienced policy constraints for the enhancement of the status of information literacy and academic curriculum for entrepreneurial education in the study area. The scholar suggested that academic librarians should be motivated to provide advanced information services through proper orientation programmes.

Kern (2008) conducted a case study on health and medical informatics in Croatia and noted that health science librarians did not keep abreast of national and regional e-health strategies and initiatives due to lack of professional orientation. The scholar suggested that librarians should be enabled to develop relevant professional skills and competence for teaching both generic information skills and aspects of health informatics in modern information environment.

Dendrinos (2008) examined the current state of computer science penetration into librarianship in terms of both workplace and education issues and noted that the shift from material libraries into digital libraries was mirrored in the corresponding shift from librarians into information scientists. The scholar further observed that the boundaries between computer scientists and information scientists are exercised in terms of research and vocational activities. The scholar suggested that upgradation of educational curricula of Greek library science departments would increase job requirements and fulfill professional needs and demands.

Warraich and Ameen (2008) evaluated the perceptions of library and information science professionals regarding a national digital library programme in Pakistan and observed that this programme provided free access to electronic resources including 30 full text databases with access to 24,000 peer reviewed online journals and e-books to universities and non-profitable research and development organizations in Pakistan. The scholars suggested that universities should utilize more digital resources in order to bridge the gap between information haves and information have nots.

Edem (2008) studied the changes and challenges to librarians in Nigerian University Libraries and noted that traditional librarians found it difficult to cope with the new age of digital library due to lack of professional orientation and capacity
development. The scholar suggested that librarians should develop new skills and overcome dogmatism which kills innovation in modern society.

Harvey (2009) assessed the transferable skills of information professionals gained through formal education, various jobs, volunteer work, hobbies or other life experiences. The study revealed that these skills could be generic which are applicable to many different jobs including the information and communications technology skills, decision making, communicating effectively, and management skills. The scholar suggested that transferable skills should be developed among the library professionals on the basis of research findings and suggestions.

Adeyoyin and Imam (2009) assessed the information users' behavioral dimensions to reference services based on cultural disintegration in knowledge acquisition both at pre-Internet and post-Internet era. The study revealed that ICT has successfully put every user, irrespective of cultural disintegration on a platform where the avalanche of information is being made available through the media. The scholars suggested that reference librarians should be trained and motivated in order to facilitate optimum utilization of information resources and services.

Ugwuanyi (2009) explored the state of ICT literacy among academic librarians in Enugu state on the basis of survey research design and observed that the level of ICT literacy skill among academic librarians in Enugu state was low though most of them indicated some elements of computer literacy. The scholar suggested that modern libraries should earmark adequate funds for the development of infrastructural facilities and manpower in modern society.

Maesaroh and Paul (2009) evaluated the current levels of education, skills, and knowledge of Indonesian academic librarians and observed that the issue of continuing professional development was more complex. The scholars have also pointed out that the situations in Indonesia and Australia were different from the point of view of professional training and development in the field of academic libraries. The results have implications for the future development of library education in Indonesia, and workplace training for Indonesian academic librarians.

Emezie and James (2009) studied the impact of digital divide on the skill development of academic librarians and observed that a good number of libraries did
not have adequate infrastructural facilities and trained manpower. The scholars suggested that library professionals should be encouraged to participate in continuous professional development in the use of ICT facilities using different methods of training which include conference, seminar, workshop, apprenticeship training, job rotation, formal training and in-service training.

Pujar and Kamat (2009) assessed the role of LIS professionals in the e-learning paradigm in India and noted that e-learning-library linkages and the innovations implemented in the top ranking off-shore public libraries was satisfactory. The study revealed that an emanating strongly bonded model of e-learning-library linkage required for the sustenance and mutual growth of the duo. The scholars suggested that the growth and development knowledge culture would be ultimately beneficial for the evolving knowledge society.

Hazeri et.al (2009) analyzed the benefits of engaging with these programs which might help to clear up this ambiguity and stated that the LIS community had a positive view of the potential outcomes of KM education for LIS students. The scholars suggested that cultivation of additional competencies among KM learners, as a contribution to the improved professionalism of corporate librarians would benefit the organizers and users in modern society.

Chourasia (2009) examined the core competencies for librarians in modern society and observe that a change in environment, infrastructure and facilities had become necessary to satisfy the user community. The study revealed that modern LIS professionals are required to adapt their skills and practice in order to meet the changing needs and demands of users.

Gole and Sane (2010) investigated the application of modern techniques in library services in the era of globalization and noted that modern LIS professionals should not be allowed to suffer from technophobia. The scholars suggested that the LIS professionals should be enabled to develop professional skill and competence through planned and deliberate proficiency development programmes.

Pinto et.al (2010) traced the growth and development of information literacy across the globe during 1997-2007 and pointed out that information literacy had shifted from the concept of simple training to the provision of the skills and
competencies that are critical to the improved use of information. A terminological, conceptual and statistical analysis of the main subjects related to information literacy, as well as its evolution over the last 30 years, is provided with the aim of illustrating how information literacy has been progressively incorporated into the library and academic fields.

Welch and Murray (2010) carried out an extensive review of literature on the growth and development of library and information science education in Vietnam and observed that significant developments had occurred in Vietnam in terms of national policy agendas and development of the internet backbone. The study also noted that community development, access to electronic resources, and education of information professionals are identified as areas for development. The scholars suggested that library professionals should be encouraged to develop information literacy, communications skill and leadership quality in order to do justice to their role.

Dalvi (2010) conducted an empirical study on information literacy for effective use of e-resources in Mumbai and observed that information literacy played a key role in helping to prepare students for the rapidly changing complex information environment. The scholar suggested that universities should develop information literacy standards and motivate the teachers and students to ensure the efficient use of e-resources in modern society.

Weiner and Jackman (2010) explored the national forum on information literacy and pointed out that academic libraries had done much to advance information literacy in post secondary institutions. The study revealed that academic librarians did not share information with them and failed to develop new partnerships that would further advance the goals of information literacy. The scholars suggested that collaborative approaches and partnership development would boost the quality of information services offered by the national forum on information literacy.

Thomas et.al (2010) evaluated the emerging challenges in academic librarianship and need for updating library services and noted that modern library associations played a significant role in preparing professionals to face the challenges offered by trends that emerge from time to time. The scholars suggested that India needed a well-laid out policy and programmes of updating and equipping its librarians continuously in the competitive information environment.
Safahieh and Asemi (2010) studied the level of computer literacy skills of librarians in the University of Isfahan, Iran and examined their avenue of computer literacy, software used, benefits derived from computer and problems militating against effective usage of computers. The study reported that modern librarians were not adequately equipped with the computer skills to take advantage of all computerized library facilities. The scholars suggested that librarians and other personnel should be equipped with computer literacy skill and professional competence in order to facilitate maximum utilization of electronic resources and services in modern libraries.

Pagell and Munoo (2010) conducted a case study on the information literacy programme implemented by the UNESCO and observed that the practical and structured framework for creating an information literacy program for trainers was adaptable to changing learner needs and changing Information and Communication Technology (ICT) tools. The scholars suggested that information literacy training programme should be designed in consultation with the experts and beneficiaries in order to enhance the practical utility.

Igun (2010) assessed the working experience and knowledge of ICTs among the librarians with reference to Nigerian university and observed that librarians with fewer years of working experience explored means of acquiring ICTs knowledge and skills more than librarians with more years of working experience in the study area. The scholar suggested that the experienced librarians should adapt themselves to the changing information environment and acquire professional skill and competence in order to do justice to their role under the changed professional circumstances.

Konnur and Kavita Rao (2010) analyzed the information literacy in higher education which has brought about a revolution in learning. The scholars have observed that the need for information literacy and its integration with the higher education curriculum was felt by the policy makers in modern society. The scholars have suggested that a multi-disciplinary approach to information literacy research and instruction will create opportunities for more substantial, curriculum-integrated and long-lasting instructional experiences that will benefit users throughout their academic and professional careers.
Farahi and Gandhi (2011) investigated the information technology skills of medical, dental and pharmacy college library professionals and pointed out that Iranian professionals gained an upper hand over the Indian professionals from the point of view of IT skills. The scholars suggested that libraries of medical institutions and para medical institutions in India and Iran should upgrade the databases in consultation with specialists and develop the IT skills of library professionals in the age of virtual environment.

Senthilkumaran (2011) examined the status of information literacy programmes in India and pointed out that modern users of electronic information resources and services needed to acquire new sets of skills in order to utilize the resources at learning centers. The study revealed that librarians had a major role in the imparting of information literacy programmes. The scholar suggested that contemporary libraries should implement information literacy programme on the basis of scientific management in order to improve the information skill of both users and service providers.

Ajegbomogun et.al (2011) made a comparative study on the information literacy among the staff of the libraries of Kenneth Dike and Nimbe Adedipe Universities, Nigeria and observed that the level of ICT awareness was very high in both the universities since there was adequate information literacy development. The study identified certain practical drawbacks such as power outrage, inadequate technical staff for immediate assistance and constant breakdown of equipment. The scholars recommended that the management of these libraries make specific allowance for the procurement of ICT facilities in such a way that librarians get necessary computer facilities and software to enable provision of effective information services.

Satpathy et.al. (2011) examined the ICT skills of LIS professionals in engineering institutions of Orissa and noted that revolutionary changes have occurred during the past few decades in library environment as a result of rapid advances in ICTs. The study revealed that modern LIS professionals must possess sufficient knowledge of new ICT skills and cater to the needs of users. The scholars also suggested that the engineering institutions need to develop infrastructural facilities
and organize continuous training programmes for LIS professionals to enhance their ICT skills.

Gangadharaiyah and Nalini (2012) examined the role of HRM in information and knowledge management in university libraries and noted that ICT tools and services were increasingly used in libraries to manage libraries more effectively and to cater to users’ demands properly in the new age of content management in networked environment. The scholars suggested that modern LIS professionals should acquire continuous skills and knowledge on the fast changing ICT scenario in order to provide better library services to the users.

Sujatha and Gowda (2012) examined the relationship between the information technology and knowledge management in modern libraries in the new age of content management in networked environment. The scholars noted that policy makers and administrators identified various types of ICT skills which should be possessed by the LIS professionals and made arrangements for systematic training in the application of ICTs. The study emphasized that ICT influenced the role of LIS professionals and offered a number of opportunities for professional and personal development.

Manjrekar et. al. (2013) examined the continuous professional development and information literacy programmes with reference to the knowledge management and organization in the digital era. The scholars noted that professionals with right ICT skills and expertise will have great opportunities in future. The scholars suggested that LIS professional organizations need to organize various training programmes for LIS professionals in order to enhance their ICT skills.

Rajan (2013) examined the relationship between knowledge management and libraries in the new digital era and noted that active participation of LIS professionals in the modernization of libraries primarily depended on systematic training and orientation on the application of ICTs for library management. The study revealed that knowledge of operating system is the primary prerequisite to manage modern libraries effectively.
2.7 Legal/Ethical Issues of ICTs

Seadle (1999) evaluated the copyright aspect of digital corporate library which is integral to everything people do in digital publishing. The scholar examined a wide range of intellectual property issues using concrete examples from current projects. The scholar reviews some of the information sources useful in answering questions relating to copyright in the networked world.

Orick (2000) studied the changing roles and ethical challenges for librarians in the new age of virtual libraries. The scholar pointed out that library professionals have to change their profile and enrich their professional competence in order to live up to the expectations of the new generation of electronic information users. The study provides useful guidelines for the improvement of human resources management with reference to virtual libraries.

Sen (2002) assessed the five laws of library science with reference to both physical and virtual libraries. The scholar observes that the library laws have stood the test of time as they became more and more acceptable as the time passed by regardless of the format and contents of library. The scholar provides useful dimension regarding the legal issues including copyright with reference to the management of virtual corporate libraries.

Rao (2003) analyzed the implications of Copyright for electronic environment with reference to India. The study reveals that the nature of digital information makes it vulnerable to copyright abuse and that copyright implications in the digital environment becomes exceedingly important especially in developing countries like India.

Miller (2003) investigated the legal issues related to digital library in European countries. The scholar observed that digital libraries have the capacity to increase libraries’ usage, attract users, provide new services and help Designation libraries where users are online. The study also provides meaningful library solutions which include licensing, interactive communication and preventive mechanisms for the betterment of digital libraries.

Orick (2007) examined the changing roles and ethical challenges for librarians of digital library in modern society. The researcher has made a comparative analysis
of physical libraries and digital libraries and reported that librarians are charged with selecting, organizing, instructing patrons and preserving information regardless of format or technology. The study reveals that information revolution has brought about new challenges to the traditional librarians since Internet services provide a large, uncontrolled and unregulated collection of resources. The scholar states that librarians in the digital library are faced with new challenges to provide equitable access to usefully organized resources, to address petition to deselect or filter, to negotiate less restrictive licensing policies and to maintain the anonymity of individual users within electronic transactions.

Jurvetson (2000) presented a research based article to a leading publication on customer relationship management in the virtual environment. The study reveals that in electronic commerce, buyers are sellers of information. The scholar suggests that suppliers should be encouraged to provide expertise and influence in terms of enhancing information service provision to library customers. The study primarily deals with the creation and trading of information which is the foundation of electronic commerce in the virtual environment.

Bobby Glushko (2011) examines about keeping library digitization legal to overcome the legal hurdles of digitization. He states that legal issues on library collections hinder libraries and archives in providing access to information. To overcome this, libraries should develop a healthy attitude towards legal issues and the digital librarian should be aware of such legal laws while working and take careful action by adopting good policies.

Johnson, S. et al. (2012). Key issues for e-resource collection development: A guide for libraries. IFLA has brought out a guide that focuses on acquisition and collection development of libraries. The purpose is to develop awareness to the key issues of the e-resources that every library / librarian should know.

Carol.C.Henderson (2013) examines libraries as creatures of copyright and why librarians care about Intellectual Property Law and policy. The author briefs the roles of libraries in United States that always involve a balancing of interests in copyright issues. Explains about the license agreements for vast majority of copyrighted works in library collections in e-environment. The author states that adapting policy to rapid technological change is never easy. Hence librarians need to
recognize the key societal functions of archives and maintain good balanced copyright law and intellectual property policy for purchasing digital information. Librarians have to apply careful and thoughtful approach to copyright law revision and rulemakings also.

2.8. Analysis of the literature survey

The review of literature clearly reveals that most of the studies have been conducted on modern library systems. Of late, though there have been a number of studies related to the ICT skills of librarians, there are gaps in the studies especially when it comes to ICT skills or competency levels of the librarians. Most of the studies are on the use of ICTs in libraries. There is no specific study conducted to measure (by using the appropriate tool) the ICT core competency skills / levels of LIS professionals working in the engineering college libraries of the State of Karnataka, India, in particular. This indicates that there is a dire need for conducting a study on mapping the Information Communication Technology skill levels of the Library professionals working in the engineering college libraries of Karnataka. No specific research has been conducted, by adopting an appropriate tool (online survey tool) on the INFORMATION COMMUNICATION TECHNOLOGY SKILLS AMONG THE LIBRARY PROFESSIONALS OF ENGINEERING COLLEGES IN KARNATAKA STATE: AN ANALYTICAL STUDY. Hence, the present investigation assumes profound academic significance.

2.9. Summary

Karnataka State is one of the developing states of Indian Republic which has got considerable number of higher educational institutions including professional engineering colleges. Karnataka is also well known in the country as the major software centre. Bangalore city has been rightly identified as the ‘software capital’ of India. Library and information resources are expanded in the State of Karnataka with a fond hope of creating enlightened professionals and citizenry in this age of information revolution. Few researchers have assessed the growth and development of traditional and modern libraries in India and abroad. There are also limited studies dealing with ICT skill development of library professionals.