Chapter 2

REVIEW OF LITERATURE

2.0 Introduction

Review of literature is the most essential step in a research process. An exhaustive survey of the relevant literature related to the topic of research is the backbone of a successful research design. Review of related studies helps the researcher to understand the different dimensions of the problem selected for study, identify gaps or unexplored areas and develop an awareness of what has been done and what has to be done in that specific area. It provides a deep insight into the various tools, techniques and methods employed by similar studies and empower the researcher to formulate his strategies, procedures and methods for conducting the study. In this chapter, an attempt is made to identify, locate, analyse and review previous studies related to the topic, published in national and international peer-reviewed journals, books, theses and conference proceedings. For identifying previous studies, the researcher primarily consulted the Library and Information Science Abstract (LISA) and Google Scholar. The identified items are located from various electronic databases like Emerald Insight, Elsevier Science Direct, Wiley Online journals, Taylor & Francis Online journals; various print and online journals; various electronic theses and dissertations (ETD) databases like VIDYANIDHI, SHODHGANGA and a lot of institutional repositories and web portals.

The studies are grouped into three sections as follows and are arranged chronologically.

- Use of electronic resources and services
2.1 Use of Electronic Resources and Services

Electronic resources (e-resources) and services have become an integral part of present day academic library system. Application of Information Communication Technologies (ICT) is evident in the resources and services of an academic institution. In the last decade we saw a revolution in the application of ICT in the academic libraries around the globe. Electronic databases, electronic journals (e-journals), electronic theses and dissertations (ETDs), digital libraries, virtual libraries, online public access catalogs (OPAC), electronic books (e-books), etc are the widely available e-resources in present day academic libraries. A lot of studies have been conducted around the world to identify the availability, usability, user satisfaction and problems related to e-resources and services. In this section, literature on the use of e-resources and services collected from different print and online sources are reviewed. A careful attempt has been made to include national and international studies conducted among engineering academics and institutions along with other disciplines and institutions. Some studies related to the Information Technology (IT) infrastructure of the libraries are also reviewed in this section.

The reviews in this section are presented under the following categories.

- International Studies
- National Studies
  - Conducted in Engineering & Technology Libraries
  - Conducted in other academic libraries
2.1.1 International Studies

The information needs and information seeking behaviour of undergraduate computer engineering students at Nanyang Technological University (NTU), Singapore was studied by Majid and Tan (2002). The purpose was to investigate the types of information sources used by the students, their preferred information formats, the importance of and reasons for using certain information sources and the use of various electronic information sources. Data was collected using questionnaire, which was distributed to 200 randomly selected students with a response rate of 51%. The study found that printed materials were the most preferred information format among the students. The top five most preferred information sources, in the order of importance, were books, lecturers, the Internet, friends and manuals. Unexpectedly, the use of databases and electronic periodicals was quite low among the computer engineering students. The study recommended a promotional campaign for introducing electronic information sources to the library users.

Tenopir (2003) reviewed around 200 research publications on the use of electronic resources that were published between 1995 and 2003. Literature were reviewed from the point of view of different aspects like information seeking behaviour and preferences, perceived advantages of e-resources, problems with e-resources, library policies, financial concerns, etc. It was found that the researchers used a variety of methods like observations, interviews, surveys, transaction logs and experiments. Some valid conclusions drawn from the review were as follows:
• Print remained as the popular medium for books.
• Use patterns of experts varied between different disciplines.
• Personal subscriptions to journals decreased due to the availability of e-journals.
• A decrease in browsing by titles was found while searching by topic increased.
• Convenience and speed of access were the perceived advantages of e-resources.
• Problems with the e-resources identified were unawareness about the availability, discomfort of reading from screen and too much of retrieved information.
• Visits to the physical library by users decreased with the increase in the accessibility of e-resources.

The use of electronic journals by the academic staff of the universities belonging to the Consortium of Academic Libraries of Catalonia (CBUC), Spain was analysed by Borrego and others (2007). Questionnaire method was used to collect data which was distributed to the entire population of academic staff with a response rate of 18.05%. The results showed that almost all the respondents were aware of the e-journals and more than 52% of them used exclusively e-journals, whereas 28% preferred both the media—print and electronic. It was found that the use of e-journals showed a statistically significant relationship with age, discipline and the respondent’s academic positions. Respondents in the disciplines of Biomedicine and Engineering were found to be the exclusive users of e-journals whereas those belonging to Social Sciences and Humanities used mainly print journals. Lack of familiarity with e-
journals and absence of e-journals in certain disciplines were the main reasons for the non-use of e-journals. It was reported that 76% of the respondents were ready to stop the print journals if their electronic versions were available. The study also revealed that research was the main purpose for consulting e-journals. A strong correlation was identified between age of respondent and use of e-journals and the format was preferred by almost all of the younger respondents. Regardless of discipline and age, a vast majority of respondents opined that their use of e-journals would increase in the coming years.

Dilek-Kayaoglu's (2008) study presented the results of a survey conducted among the faculty members of Istanbul University, Turkey to examine their use of electronic journals. An online questionnaire survey among a selected sample of 590 academics was taken. An overall, 75.6% respondents were reported as frequent users of e-journals. The study pointed out that the association between frequency of use and the age of respondents was highly significant. The Chi-square test conducted to examine the association of frequency and discipline, produced highly significant results showing that the very frequent users were from health science followed by natural science. Anyhow respondents belonging to all the discipline preferred the electronic format and around 73% of the respondents were in support of the shift from print to e-only journals. Another major finding was that 59.7% of respondents irrespective of their disciplines pointed out that a major barrier for their use of e-journals was the lack of sufficient subscription in their subject area.
Chinese university students’ use of digital libraries was studied by Liu and Luo (2011). The authors analysed the extent of the difference between graduate and undergraduate students in China in their use of digital libraries. 400 questionnaires were distributed to the students of different disciplines of 3 universities in China and received a response rate of 70%. It was found that on an overall, factors for using digital libraries were quite similar among undergraduate and graduate students. Factors such as “remote access,” “24-hr. access,” and “faster access” were among the most important factors identified by both user groups. Non-use factors, perceived influences, and degree of satisfaction were found to be quite different between undergraduate and graduate students due to their differing emphases and expectations for information. The authors opined that librarians had to explore creative ways to increase the visibility of digital resources and to work with faculty members to promote the use of digital resources.

2.1.2 National Studies

2.1.2.1 Conducted in Engineering & Technology Libraries

The level of effort taken by the engineering college libraries in Karnataka, India in building electronic resources and services was examined by Mulla and Chandrasekhar (2006). It was found that the availability of electronic resources was high among one fifth of the libraries and a low level availability was identified in 34% of the libraries. The reasons behind the non-availability were identified as (i) lack of awareness among the academics regarding e-resources in their subject, (ii) absence of library collection development committees having a complete inventory of authorized online resources, (iii) lack of demand
from the users and (iv) lack of proper ICT facilities. The study concluded that the collection and service infrastructure of the libraries were not satisfactory due to the following factors: lack of ICT infrastructure; lack of IT trained manpower; lack of awareness of the digital resources; lack of user demand; lack of financial support; lack of knowledge about the digital preservation methods; and lack of training for the digital access.

Majority (95%) of the library users of IIT Delhi were found to be aware of electronic information resources provided by their library, according to a study conducted by Ali (2006) to investigate the awareness and utilization of e-resources among the users of IIT Delhi. It was observed that 65% users utilize this service regularly. Tools used for data collection were questionnaires, observation and informal interviews. About 325 questionnaires were distributed among the users and 300 filled questionnaires were collected back. Regarding the difficulties faced by the users while accessing e-resources, 41% responded that they face "no problem”. 20% users were facing a lack of knowledge about resources. Other difficulties identified were lack of technical assistance and slow downloading. With respect to the infrastructure facilities, 57% users opined that the number of nodes for accessing e-resources were inadequate.

A questionnaire survey was conducted by Gunasekharan, Balasubramani and Sivaraj (2008) among 200 students and faculty members of Bannari Amman Institute of Technology, Tamil Nadu to study the usage of electronic journals subscribed through INDEST-AICTE consortia. Over a response rate of 100%, it was found that all the
respondents were aware of the e-resources and opined that these resources were very useful due to various reasons like currency, time saving, more number and variety of information resources, etc. Proper instruction/orientation provided by the library was identified as the main reason for the awareness and usage. Most of the users used e-resources for course work and for getting latest information resources. The factors that hindered the effective use of electronic resources were identified as lack of time and slow internet speed. The authors suggested increasing the speed of internet access. The study concluded by stating that “in order to motivate the engineering students for research, other e-databases like ACM Digital Library, Elsevier’s Science Direct, Compendex plus and INSPEC may also be added to the library collection.”

An increase in the usage of e-journals in IIT Delhi was reported by Kaur and Verma (2009). The study was intended to investigate the use of electronic resources and services provided by the central library of IIT Delhi by means of a structured questionnaire distributed among the undergraduates, postgraduates, research scholars and faculty members. The study identified the potential users of electronic information services, the frequency of their use and the place where the information was accessed. User’s awareness about the library e-resources and services as well the accessibility available at various places in the institute, like hostels and departments were found to be the reasons behind the increased use of e-resources. The study also revealed that the number of users visiting the library has decreased due to the availability of the resources in the campus.
The awareness, access, and utilization of open courseware [published by Massachusetts Institute of Technology (MIT), Tokyo Institute of Technology (TITECH) and Utah State University (USU)] and e-learning course materials of Visvesvaraya Technological University (VTU) among the computer science and engineering academics of engineering colleges in Mysore city was explored by Ghalib, and Talawar (2009). The paper gave a brief outline of Open Source e-Learning Courseware (OSeLCW) movement. The results of the study reflected maximum awareness, access and utilisation of the open courseware from the VTU followed by MIT, TITECH, and USU websites respectively by respondents. A significant observation was that unlike students, educators download more files from MIT open courseware than VTU e-learning courseware since MIT offers highly sophisticated scholarly materials. The study suggested that adapting OSeLCWs by higher education institutions will lead to improvement in the teaching and learning process and thereby produce globally competitive graduates and post graduates. The authors also suggested that in order to increase the awareness and utilization of OSeLCWs, sensitization and information literacy programmes have to be made by libraries and information centres cooperatively with educational administrators.

The impact of electronic resources in engineering and technological institutions in India was examined by Kaur (2009). A questionnaire survey was conducted among the faculty members, research scholars, undergraduate & postgraduate students in 4 institutions including two IITs, one university and one college. It was found that majority of the users from IITs were aware of electronic resources and services whereas most of the users from the other 2 institutes were unaware of the
service. Internet and online catalogs were the widely used and accepted e-resource which is followed by e-journals. Whereas the use of e-books, CD-ROMs and video cassettes were found to be comparatively low. Users preferred both the formats of resources-print and electronic. Only a few number of users were of the view that e-resources can replace the print resource. The study recommended that while subscribing e-resources, user preferences and priorities need to be considered for better usage. The study also suggested to impart proper training to enhance staff skills to assist users efficiently.

**Handa and Singh (2010)** conducted an evaluative survey to assess the management, resources and services of engineering colleges affiliated to the Punjab Technical University. Questionnaires were distributed to all the 82 colleges affiliated to the university. It was found that 71.09% of libraries had a book selection policy. The paper presented a thorough discussion of the resources, organization and services of the libraries under study. The authors opined that there was a scarcity of adequate professional staff. With respect to the IT infrastructure, the study pointed out that there was a wide gap among the colleges. Some libraries had made substantial growth in this direction while some others were planning or in the early stage of implementation. The study suggested to improve the collection development policy and the extent of IT application in the libraries.

The computer infrastructure facilities and the status of computer-based library services offered by the 20 National Institutes of Technology (NIT) libraries in India were analysed by **Rao and Choudhury (2010)**. The major findings of the study were that majority of the libraries have
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got sufficient number of computers and other electronic equipments like scanners, printers, etc. Almost all the libraries got good communication facilities. Regarding services, 90% of the NIT libraries provided online journals and e-books. Nearly 70% of the libraries provided orientation programme and training to the users and staff. The provision of virtual reference, e-current awareness, electronic/web-based document delivery, electronic theses and dissertations, and e-publishing services among NIT libraries were comparatively less and no library under the study provided videotext/teletext and video/teleconferencing facilities. The authors concluded that, many NIT libraries could expand their infrastructure capacities to offer better services to students, researchers, faculty, and staff.

E-databases and e-journals were the most used e-resources by the faculty members of C.V.Raman College of Engineering (CVRCE), Bhubaneswar as reported by Satpathy and Rout (2010). The authors analysed the faculty members’ awareness and use of e-resources by means of a structured questionnaire survey. Upon a response rate of 80%, it was found that faculty members were aware of e-resources and knowledgeable about copyright/IPR issues. E-databases and e-journals were followed by e-books and ETDs with respect to their popularity. The main purposes for using these resources were identified as study and teaching followed by research works. The study pointed out some dissatisfaction among the respondents regarding the available resources. Non availability of the needed e-resource was the main reason behind this followed by lack of sufficient infrastructure. Majority of the respondents opined that e-resources were useful to a great extent. Less time in searching, simultaneous usage, downloading facility and
early availability of journals were the main advantages as mentioned by the respondents. Finally the investigators suggested to improve the access facilities with high Internet speed and subscription to more e-resources by the Central Library of CVRCE.

The engineering faculty members’ perception and preferences of electronic resources were studied by Sharma and Sharma (2010). The results of a structured questionnaire distributed to 62 randomly selected faculty members of NIT Kurukshethra showed that most of the respondents used e-resources. E-journals were the most popular e-resources among the respondents. ETDs and e-books had comparatively less number of users. Majority of the respondents used their library websites as a gateway for e-resources. Further, the study pointed out that majority of the faculty members preferred e-resources to traditional resources and most of them had got formal training in the use of e-resources. The study recommended conducting training and orientation programmes to make the faculty members more aware of the resources in their concerned fields for the optimum utilization of the available resources.

Kumar and Kumar (2010) examined the perception and use of e-resources and the internet by the engineering, medical and management academics in Bangalore City, India. Data were collected from 300 students and faculty members in selected engineering, medical and management colleges of Bangalore City by means of questionnaire method. The results showed that 70% of the respondents were aware of electronic resources with the engineering academics being more aware as compared to other disciplines. The main purposes for using e-
resources were study and teaching where as one third of the respondents used e-resources for their project work. An important finding was that even though the e-resources were much popular among the respondents, 65% of them still prefer the print format along with e-resources. Regarding internet use, it was found that all the respondents used the internet for different purposes that included study, teaching, collecting general information, updating subject knowledge, etc.

The use of e-resources by the academic staff of engineering colleges of Rajasthan was analysed and evaluated by Bhatt and Rana (2011). The study considered various factors of e-resources usage such as purpose, impact, importance, problems, acceptance, and satisfaction with e-resources. The study revealed that all the respondents used World Wide Web service. E-journals were the next preferred resource by most of the respondents followed by ETDs. It was also found that academic staffs were using other types of e-resources like e-groups, virtual conferences, etc. The major purpose for using these resources was academic and research activities. 68% of the respondents incorporated e-resources with teaching methodology to some extent and majority of the respondents opined that e-resources have a considerable impact on educational activities. The academics preferred both versions of documents for their students. The study also revealed that most of the respondents got information about e-resources from their library staff.

IEL online was found to be the highly preferred database by the academics of Krishnaswamy College of Engineering & Technology Library, Cuddalore. Dhanavandan, Esmail and Nagarajan (2012)
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investigated the extent of use of e-journals in the college library by means of a questionnaire survey among 150 library users including faculties and students. The study revealed that majority of the users was aware of electronic resources in their library. The preferred items were e-journals and e-books. Around 60% of the users rated the e-resources available at their library as good. Slow speed in connectivity and downloading, lack of training in using the resources and overload of information were identified as the problems encountered by the users. Most of the users were satisfied with the e-resources available in their library.

2.1.2.2 Conducted in Other Academic Libraries

The pattern of use and extent of satisfaction of digital resources among the PG students and faculty members of Dental colleges was studied by Kumar and Lohar (2008). Data was collected using a structured questionnaire distributed among 217 faculty members and students in 3 dental colleges in Karnataka with a response rate of 80.72%. The study identified the purposes of using digital resources and found that the students consulted digital resources mainly for their research activities, whereas faculty members used it for keeping abreast with the subject, article preparation and to prepare teaching aids. The most used digital resources were the e-journals followed by CDs/DVDs. The study revealed that the users were almost successful in finding required information in internet and CD-ROMs. Further the study recommended to create awareness among the users to use digital resources by organizing training programmes and maintaining an update OPAC of the available digital resources in the library portal.
“Science research scholars prefer e-resources to print resources”, revealed a survey conducted by **Gowda and Shivalingaiah (2009)** to analyse the attitude of research scholars towards usage of electronic information resources in the universities in Karnataka. The authors identified a gap in the need and availability of e-resources and a decrease in the use of print resources for research purpose as compared to the use of e-resources. Majority of the respondents favoured the usefulness of e-resources and agreed that ICT and e-resources have greatly benefited the quality of research in their field. The study identified that lack of awareness of e-resources and inefficiency in finding relevant information were the factors corresponding to the less usage. The authors suggested conducting proper training and information literacy programmes at regular intervals to promote the usage of e-resources.

Teachers used e-resources for the preparation of teaching aids and for the purpose of research. The use of electronic resources among college teachers in Guntur District of Andhra Pradesh was analysed by **Sivaprasad, Dhana Lakshmi and Rao(2009)** by means of a survey based on a stratified random sample of 80 teachers. The purpose of using e-resources, the frequency of use, preferences for different formats, hindrances of use and the impact of e-resources in their teaching were brought under the purview of the study. Google was the most familiar search engine among the teachers and the preferred format was PDF. The most preferred e-resource was internet followed by e-journals. Another important finding was that OPAC was the least used e-resource by the respondents. Regarding the hindrances of using
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e-information resources, most of the respondents pointed out that too much of information retrieved hinder their effective use of e-resources.

A case study regarding the use of electronic resources by the faculty members and research scholars in eight different faculties of Annamalai University was made by Natarajan et al. (2010). For collecting data and analysing the awareness, use and user perception of electronic resources, a questionnaire survey along with observation and interview methods was conducted in November 2008. A total number of 350 questionnaires were distributed and received a response rate of 65.25%. It was found that majority of the users were aware of e-journals, e-books, e-newspapers, e-theses and e-databases whereas most of the users were unaware about other resources like e-dictionaries, e-encyclopedia, etc. E-journals were the most accessed item followed by e-newspapers and e-theses. The study revealed that despite the availability of wide range of e-resources, the frequency of their use was low. The reasons identified for this were slow downloading, lack of subject coverage, lack of time, lack of training, etc. The authors concluded by suggesting that wide publicity and training were necessary for maximising the use of the available resources.

2.2 Resource Sharing and Consortia

Resource sharing (RS) is an age old concept that has successfully supported the libraries all over the world for catering the information needs of its clientele. Earlier form of RS was mainly the inter library loan (ILL) of books between co-operating libraries. From there, the concept has expanded to sharing of expertise & infrastructure, collection sharing, consortia and document delivery services. The emergence of
different resource sharing consortia since the 1990s changed the scenario of RS in academic libraries. Many learned journals, conferences and seminars discussed the new environment and a lot of literature dealing with the success stories, problems and prospects of RS and consortia have come out. Here an attempt is being made to cover this literature published since 2002.

The reviews in this section are presented under

- International Studies &
- National Studies

### 2.2.1 International Studies

The literature published from 1960s to 2000 on academic library consortia was reviewed by Nfila and Darko-Ampem (2002). For this two bibliographic sources were consulted: the Library and Information Science Abstracts (LISA), and the Information Science Abstracts (ISA). The review gave a correct picture of the background describing why this phenomenon occurred, the reasons for forming consortia, the phases of this process and the benefits that the libraries accrued through consortia; together with world-wide examples of existing practice in Africa, Australia, Europe and North America. The paper highlighted that libraries through consortia arrangements have been able to withstand the twin evils of budget cuts and high prices of information resources. The authors stated that technological advancements coupled with the willingness to meet the challenges of coexisting together, consortia hold a big promise for the library world. According to the authors the development of library consortia showed a shift from a peripheral and limited RS to an integrated system-wide and formalized RS.
The RS initiatives in Pakistan were described by Jaswal (2005). The changes that the technology revolution has brought to RS activities were briefly discussed. The author stressed the need for developing interoperable online catalogs that support federated searching instead of centralized union catalogs. The author opined that digital library technology can compliment to the existing scholarly publishing model with an innovative publishing structure which enables faster online distribution facility as well as the systematic documents management.

Sharif (2006) discussed the methods followed in Pakistan for RS and pointed out that RS was mostly informally practiced in the country. The paper pointed out some of the formal RS projects in the country and discussed their objectives, functions, products, etc. The paper suggested that the library professionals and library associations should take initiatives in framing policies, procedures and standards for effective RS. The paper also suggested some models for resource sharing among Lahore libraries as follows:

Model 1 (Inter type-RS) different types of libraries in the city, regardless of their scope, resources, and clientele, can share their resources.

Model 2 (Intra type-RS) where a library can share its resources with another library of the same kind.

Model 3 (RS through consortia) in which resources (selected print and electronic) can be housed at a central place and access can be provided to the institutions/organizations.

Rotich and Munge (2007) examined the success and failures of different RS initiatives among Kenyan universities. The paper briefly
discussed the objectives and activities of different RS efforts in the country like the African Virtual Library-Kenya Chapter (AVL-K), Kenya Education Network (KENET), Program for Enhancement of Research Information (PERI), Electronic Supply of Academic Publications (eSAP) project, Database of African Theses and Dissertations (DATAD) initiative, East African Network of University Libraries (EANUL), Kenya Libraries and Information Services Consortium (KLISC), etc. The authors analysed the success achieved by these consortia efforts on the basis of certain checkpoints as follows:

- Assisting libraries to automate as a prerequisite for online information sharing;
- Facilitating the provision of, and access to the collective bibliographic and other electronic information resources held by partner institutions;
- Supporting collaboration and networking among participating institutions; and
- Developing ICTs skills for personnel in member institutions

It was observed that these initiatives have played a big role in laying the groundwork for automation of a good number of the libraries and information centres in Kenyan universities. It was also observed that these initiatives succeeded in providing sufficient platforms like portals, directories, etc for facilitating easy information access. The initiatives were found to be interested in supporting collaboration and networking as well as imparting training for developing the ICT skills of personnel. Lack of sufficient internet connectivity in the participating institutions due to the high tariffs for bandwidth was found to be the major problem towards the successful implementation of resource sharing in the
country. Lack of funds especially for public funded institutions was another problem. Lack of clear cut policies and scarcity of sufficient information resources particularly digital resources also hindered the effective RS among the institutions.

The developments in French academic inter library loan network (ILL) was discussed by Gillet (2008). The author gave an outline of how the Institute for Scientific and Technical Information (INIST-CNRS), the French leader in the document delivery market, works with a broad national and international network of some 200 libraries. The author pointed out that the possibilities for accessing electronic collections have a direct impact on document demand. The pricing system for document delivery and different factors affecting the document supply were discussed in detail. It provided an overview of French copyright legislation, as well as information on negotiations with publishers on secure electronic delivery. The findings stated that RS and networking in document delivery on a national and international level have become essential to maintain good quality library services.

Ameen (2008) made a qualitative survey to explore the barriers in collection sharing among well established university libraries in Pakistan using interview method. The major objectives of the study were to identify the status of collection sharing among the university libraries, to identify the reasons for non participation in collection sharing and to propose a possible way for collection sharing. It was found that only 13% of the libraries were involved in some collection sharing in the form of interlibrary loan whereas the majority (87%) was not involved in any formal collection sharing programs. The study
identified two types of barriers in collection sharing: 'Technical and procedural barrier' and 'Psychological and behavioural barrier'. The absence of automated catalogs, union catalogs and webopacs were the major items under the first barrier. The feelings of the librarians that they do not have the authority to develop formal plans for sharing as well as their fear about loss of materials while sharing were the major barriers under the second type. The study suggested that government authorities, librarians and library organizations should seriously take up this matter and should explore the possibility of resource sharing at local, national and international level. Development of webopacs should be taken as a matter of priority and electronic media should be used to share the collection efficiently and safely. The study recommended that the library associations should frame the protocols and procedures for effective sharing at local and national level.

Lawal, Bassey and Ani (2008) investigated the resource sharing activities among law libraries in Nigerian universities by means of a questionnaire survey. All the respondent librarians opined that RS is desirable for their libraries and majority of the respondents replied that they share their resources among themselves. The most common forms of RS were reported as admittance followed by donation/gift. The least common modes of RS were exchange of personnel and cooperative classification. A major finding was that majority of the respondents were not having a written policy for RS and 60% of the respondents were found to be satisfied with their current mode of RS activities. The study identified the obstacles towards proper RS. The major obstacles were insufficient copies of resources and lack of fund. The study put forwarded certain solutions to overcome the obstacles and collected the
opinions of the librarians. It was found that increased awareness about the need for RS among law libraries as a major way for carrying out effective RS.

The development and functioning of the Anatolian University Libraries Consortium (ANKOS), Turkey was described by Erdogan and Karasozan (2009) and opined that ANKOS made a positive impact towards the research and publication outputs. An important peculiarity of the consortia highlighted was that it was not a purchasing consortium and only a negotiator and hence the consortium was not a funded body. The individual members could make the subscriptions on the negotiated rates from their own funds. The authors opined that the newly founded universities with lesser collections benefitted from the consortium than the older ones. The functioning of the consortium was carried out by its different working groups in which librarians from different university libraries worked voluntarily. The authors pointed out an enormous download of full-text articles through the consortium which was in turn positively correlated with the publication output of the academics.

The success factors behind Library and Information Web Access (LIWA), the interlibrary cooperative activity among three United Arab Emirates (UAE) universities were discussed by Taha (2010). The consortium's primary aim was interlibrary lending and for this a union catalogue of the three participating institutions were developed. The paper discussed the circulation policies of the consortia and the statistics of interlending. It was found that the consortium handled 983 transactions during the period from 2007 to 2010. Further the author made a SWOT analysis of the project. The success factors identified
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were stable budgets, well equipped libraries with computers and network infrastructure, rich variety of resources, use of standard rules and formats, and use of similar OPAC software. The identified weaknesses were the different acquisition policies of member libraries, institutional circulation policies that restricts certain items from being lend out, and exclusion of digital resources from sharing. The author concluded by proposing a model for a fully developed consortium that handles e-resource sharing also.

USA was identified to be one of the few countries in the world where interlending and document supply continue to increase. The factors that led to this increase were examined by Mak (2011). The Association of Research Libraries (ARL) ILL borrowing statistics showed that increase in interlending is 660% over a period of 35years. Similar trends of increase in interlending were also reported by various other cooperative efforts of the country. The paper discussed the factors behind the success stories of different interlending and RS programmes in USA. It was found that the effectiveness of RS facilitated by intra and inter-state cooperatives using OCLC as a framework was a major factor behind the success. Other factors pointed out in the study were the improvement in discovery tools, requesting processes and the more recent improvements in the delivery process.

Owolabi et al. (2011) examined the current state of RS in Nigerian university libraries by means of a survey using questionnaires and interviews. Questionnaires were distributed among 104 university librarians in the country and a response rate of 65% was received. The findings revealed that majority of Nigerian university librarians agreed
that RS was important and exchange of publications was the most common mode of RS. Majority of the respondents were satisfied with the current RS arrangements. Some major hindrances to RS identified were lack of security of materials and lack of funding. The study recommended conducting seminars and conferences to improve the awareness about RS among professionals. The authors recommended the government and National Universities Commission of Nigeria to allocate proper funds and promote the effective sharing and networking of libraries in the country.

The Ohio Library and Information Network (OhioLINK) shared catalog service handled about 800,000 requests annually. *Cook and Smith* (2011) described the development and implementation of the OhioLINK shared catalog and patron-initiated online borrowing process. The procedures of document delivery to patrons along with OhioLINK’s experience with missing and lost materials, including lessons learned regarding lost materials and billing were discussed in detail. An analysis of the usage statistics of OhioLINK services represented the growth of the service. The article summarized the success of this unmediated borrowing process.

*Williams and Woolwine* (2011) conducted a questionnaire survey among the American academic libraries participating in the ILL system of OCLC to study the ILL activity and practices, licensing agreements and the effect of digitally held full-text articles on ILL rates. A second focus was an examination of how the size of print journals and monograph collections affected ILL activity. The study gathered ILL statistics for the period from 1997–2008 and found out that there was a
general increase in ILL activity since the 1990s. The study reported a strong correlation between print journal and monograph collection size versus ILL activity. A major finding was that the presence of licensed databases with full-text content did not seem to have adversely affected interlibrary loan activity. The presence of a link resolver was also correlated with increased ILL activity. Finally, the study found that there was no overall reduction in ILL department personnel in the last 5 years and the presence of a professional librarian as head of the department was also positively correlated with ILL.

The potential impact of e-resources on RS was reviewed by Hales (2012). The paper gave a brief description of the growth of library cooperation around the world and opined that after over a century of work by library professionals and technological developments, interlibrary loan has now become a prevalent and essential library service. Further the paper discussed the legal barriers of sharing electronic resources especially the licensed content. The author pointed out that libraries are discouraged or even prohibited from sharing their electronic resources unless they have negotiated for ILL in their license agreement. The case of purchased e-books were also discussed, where the author highlighted that most of the license agreements of e-book purchases impose restrictions in sharing the document in electronic format. The author remarked that the growing prevalence of electronic resources in the libraries and their copyright restrictions would create a great threat to the ILL in the future. The paper suggested that the library professionals should adopt new resource sharing models like demand driven acquisition and consortium short-term-leases to overcome this barrier.
“RS continue to grow as a critical information service in libraries around the world” opined Goldner and Birch (2012) by providing an overview of the historical developments in RS and ILL around the world. The paper discussed the impact of the changes in technology and publishing on RS in the digital age. The authors conducted a PEST (Political, Economical, Social and Technological) analysis of the factors affecting present day RS and pointed out certain challenges for effective RS in the digital age such as distributed knowledge bases, incompatible systems, and electronic formats which often prohibit sharing of materials between libraries. The authors remarked that the librarians need to work together with all players in the industry, to garner for libraries the same rights to e-journals and e-books that had been available for physical materials for decades. The paper stressed that the librarians also need to raise their voice within the political systems of their countries in order to promote copyright legislation that serves the interest of information seekers and civic populations as well as publishers. The authors concluded by stating that "open systems that support data sharing and reuse should be encouraged, as they represent a form of 'meta resource sharing' in themselves."

2.2.2 National Studies
The need for RS among academic libraries was discussed by Sridhar (2002). According to him, 'co-operation is the more talked and less acted area". The author explained some psychological and egoistic facts that hurdles effective RS. The involvement of more people in decision making related to RS activities created practical difficulties in achieving the goals. Fear of centralization and autonomy were other hurdles
identified by the author. Further the paper discussed the cost considerations of RS and substantiated that the cost per use of a document received on ILL was less than its acquisition and circulation costs. The author suggested that development of basic infrastructure facilities, proper management of ILL and quick document delivery were necessary for effective resource sharing. For enhancing the RS activities in future, the author recommended to develop databases of project reports, textbooks, table of contents services, user orientation modules, etc and strategies to harness the web resources.

The role of internet in enhancing the RS activities of special libraries in India was investigated by Sreekumar (2005). Structured questionnaires were used to collect the required data from a stratified sample of libraries and librarians and a cluster sample of users. It was found that the advent of the electronic information environment widened the gap between the information rich and the information poor libraries at an alarming rate. The author stressed the importance of open source software in the current era and pointed out that E-Publishing, Open Archives Initiative (OAI) and the Open Access (OA) movement gave a face lift and a paradigm shift to the scholarly information systems. Based on his observations and experience, a working model of an ideal digital information system (the IIMK library portal) that integrates their library website with the IIM Library Consortium, digital library(DL) and their institutional repository(IR) was developed.

“In India, the process of resource sharing is shifting from print to electronic resources”, pointed out Ghosh, Biswas and Jeevan (2006).
The authors analysed the state of libraries in India and summarised the strategic cooperative initiatives undertaken by these libraries to improve user access to electronic information services. Data was collected by means of literature searches, personal interviews and e-mail interaction. The study pointed out that there is tremendous potential for information technology enabled information access in the country. The paper provided a list of top ten issues to be tackled by the Indian libraries for streamlining the consortial efforts. The authors suggested the need for a viable and sustainable model that can use local capabilities and provide high quality services at lesser cost.

Jayakanth, Sharada, and Minj (2007) stressed the importance of having a union catalog (a centralized database) of the participating libraries to make the inter library loan service more efficient. For this, the authors suggested to implement OAI-PMH for building and maintaining union catalog of OPACs, wherein, the participating libraries expose their metadata, which are harvested and ingested into the union catalogs thereby eliminating human intervention in maintaining currency in union catalogs. Based on this the authors proposed a centralized model of an OAI based union catalog wherein a single centralized database will hold all the bibliographic data from the heterogeneous, distributed OPACs. The authors also mentioned some of the open tools that facilitate the OPACs to be OAI-compliant. Once the individual OPACs are made OAI-compliant, the base URLs of such OPACs are to be registered with an OAI-based service provider. The service provider will then periodically harvests metadata from the registered OPACs and update their central index.
Review of Literature

The status of engineering college libraries in Kerala with respect to their collection, financial position, IT infrastructure, staff, etc was analysed by Azeez (2007). Out of the 76 colleges in the state, a random sample of 14 colleges under government, aided and self-financing sectors were selected and data was collected by means of structured questionnaires, interviews and observations. 1800 questionnaires were distributed among the library users and a response of 80% was received. The analysis showed that most of government and self-financing colleges lacked a considerable subscription of foreign journals. Few libraries were having a subscription of online journals and cd-rom databases and most of these libraries were in the aided and self-financing sectors. About 50% of the librarians opined that their information resources are inadequate owing to the lack of sufficient budgets, adequate library personnel and modern infrastructure. Majority of the library users were satisfied with their collection of books and journals irrespective of the type of colleges. Where as they were not satisfied with the provision of inter library loan, internet facilities and other e-resources. A good majority of the users and librarians preferred electronic documents to print and IEL online was the most popular e-resource followed by Science direct. Only a few colleges had a membership in consortia (DELNET) and a huge majority of them supported the formation of a consortium of engineering colleges in the state. Finally the investigator proposed a model for the consortium of engineering college libraries in Kerala.

A design for networking engineering college libraries in Tamil Nadu, India, called Tamil Nadu Engineering College Libraries Network (TECLIBNET) was proposed by Sivaraj, Esmail and Kanakaraj.
The study stressed the need to bridge the information divide in engineering college (EC) libraries, owing to the growth of engineering literature, increasing costs of publications, and declining budgets. The authors opined that the proposed network would improve resource sharing and information access for the academic community in Tamil Nadu. The paper discussed three models suitable for the network:

**Model 1** - Linking of homepages of all EC libraries in TamilNadu.

**Model 2** - Creating an integrated library database.

**Model 3** - Establishing connectivity using search-engine architecture.

The paper concluded by stating that "It is necessary to establish a library network among all engineering college libraries in Tamil Nadu for maximum use of resources for the benefit of the students, faculty, and research scholars, and to improve the quality of education".

Satija and Kaur (2009) explained briefly the concepts of RS and consortia & pointed out that interlibrary networking and a strong communication system along with staff training and information literacy programmes are the core of successful RS. The paper discussed the trends in RS and gave a brief description of various RS initiatives in India. Further, it discussed the benefits of collaborations and analysed the use of e-resources in different technological institutes in North India. The major finding of the study was that the use of resources was low in comparison with the subscription cost and users find a lower percentage of relevant journals they needed since they were not consulted about inclusion or exclusion of any resources. Another important finding was that the state run and private institutes lack adequate funds and infrastructure to access and use e-resources and the users had to visit IITs and NITs to have access to resources that were
not available to them. The author concluded by stating that the INDEST- AICTE and UGC-INFONET, both open-ended consortia, have brought about a revolution in the field of RS.

The possibilities of developing a state wide consortia of engineering colleges in Maharashtra, India was explored by Ghosh (2009). The study revealed that more than half of the respondents were engaged in some sort of RS activities. The most popular activity was the joint subscription of e-resources followed by interlibrary lending, digital preservation and cooperative cataloging. Informal cooperation using the librarians’ personal networks was also prominent among the libraries. 53% respondents indicated a lack of satisfaction with the present level of cooperation. The reasons behind this dissatisfaction as pointed out by the respondents were the unaccessibility of catalogs of participating libraries and reluctance of unaided engineering libraries to help each other owing to the competitions among these institutions. The study identified some major obstacles towards cooperation. Absence of RS agreement between libraries, lack of uniform standards in cataloging, absence of a strong leadership to steer the programme were some among them. Based on the observations, the author suggested the formation of the Maharashtra Engineering Libraries consortium (MELC) with an architecture for developing a union catalog for the MELC that involved 3 components- a client, master catalog and member library catalog. The prototype developed by the author envisaged 2 models:

**Model 1**- Master union catalog: The participating institutions catalog their material to the central database and then load to the local databases the new or modified records.
Chapter 2

**Model 2:** Individual libraries' union catalogs: The participating institutions catalog their material at first locally and then load the new or modified records to the central database. The author concluded by stating that "the proposed MELC will generate optimum user satisfaction and save users considerable time when searching for resources".

“The accessibility to international journals in Indian universities and technical institutions has improved to a great extent with the setting-up of a few Government-funded library consortia”, stated Arora and Trivedi (2010). The authors described the major activities, operations and services of the UGC-INFONET Digital Library Consortium which was set up in 2004. A clear overview of subscribed resources, different categories of memberships, licensing agreements, governing structures etc was made. While describing the economics of the consortium, the authors pointed out that the membership, intensity of usage, successful migration from print to electronic version (with discontinuation of print) and cost avoidance were the factors that determined the economic viability and cost-effectiveness of a consortia-based subscription. The authors presented the comparative usage of various resources through 2005 to 2008 and found out a consistent increase in usage from 2005 to 2008 for all e-resources. The paper also mentioned that one of its future endeavours is to launch college model of the Consortium under a joint project entitled “National Library and Information Services Infrastructure for Scholarly Content (N-LIST)”. The authors concluded by stating that "access to e-resources would invariably make qualitative difference on research, learning, scholarly and R&D activities of faculty and researchers."
The success story of DELNET- resource sharing network in India was described by Kaul (2010) and presented the results of a survey conducted by the author to study the utilization of DELNET services among its member libraries. An analysis of the data showed that 91.8% of the users were aware about the services of DELNET and majority of the users frequently used the services. An important finding of the study was that private institutions were the major and frequent users of DELNET owing to the higher membership charges and rigid policies of other consortia like INDEST and UGC-INFONET in the country. The survey results highlighted that 86% of member libraries found DELNET union catalogs useful. The DELNET Inter library loan and Document delivery service (ILL/DDS) was the most popular service.

The major functions, activities and services of the INDEST-AICTE Consortium which was launched in 2003 were described by Arora and Trivedi (2010) and stated that it provided differential access to 12,000 electronic journals and six bibliographic databases from a number of publishers and aggregators to 48 centrally-funded technical institutions, 60 government and government-aided engineering colleges and 820 private engineering colleges, and other organisations. The authors opined that launching of INDEST-AICTE Consortium and UGC-INFONET Digital Library Consortium resulted in the increased availability and accessibility of e-resources in centrally-funded technical institutions (IITs, IISc, IIMs, IIITs, etc.) and universities, which in turn resulted in the setting up of a new culture of electronic access and browsing in academic institutions. The article gave a brief overview of its resources subscribed, terms of licenses, policies and practices for archival backups, membership programmes including core members,
AICTE-supported institutions and self-supported category of membership, etc. The paper outlined the governing structure of consortium and their roles. An analysis of the usage statistics reflected a consistent increase in the use of all types of e-resources in all categories of institutions. The authors pointed out that the subscription cost for IEL online and ASCE online came down drastically as more number of members joined the consortium where as some other publishers did not charge additional amount for the next year's renewal. The paper concluded with a mentioning of some of its future plans such as developing interoperable institutional repositories in member institutions, web-based union catalogs of journals and books, co-operative cataloging of internet resources, etc.

Siddanagouda (2013) investigated the needs for RS and networking of college libraries affiliated to Gulbarga University, Karnataka. A questionnaire survey along with interview of selected college librarians was made and received a response rate of 81%. A vast majority of the respondents supported the formation of a state-wide network and expressed their willingness to share their resources. It was found that the respondents had a positive attitude towards resource sharing networks. A majority of them thought that taking membership in consortia was very useful. The author suggested allotting adequate funds for the collection development of electronic resources in the colleges. Further a model for the state-wide consortia was proposed by the investigator with the details of its network architecture, technical, financial and professional requirement. The investigator stressed the need for employing professionally qualified librarians and technically skilled supporting staff for the successful functioning of the network.
2.3 Virtual Libraries/Digital Libraries

Digital libraries (DL)/Virtual libraries (VL) have become an integral part of an academic library system now a day. A lot of research is being carried out in different parts of the world for the development and enhancement of DL/VL. Library professionals and academics collaborate with computer professionals in the development of efficient systems. The advent of open source software (OSS) opened new vistas for the development of DLs/VLs as well. A good number of papers have been published in referred journals, conference proceedings, books, etc dealing with the different aspects of the development, use and design of DLs. In this section some national and international papers are reviewed to understand the growth of the subject.

The reviews in this section are presented under

- International Studies &
- National Studies

2.3.1 International Studies

Korwitz (2002) outlined the design and development of a Virtual Medical Library (VML) in Germany which was a co-operative of the Deutsche Zentralbibliothek fur Medizin (DZM), the German national medical library in Cologne with other libraries and information agents like online hosts and research institutions. The design was based on a comprehensive user study on the need for medical information and literature and the opinion of the users regarding a sample virtual library portal. The respondents demanded a single access point where they get complete (fee-based and free) medical information with simple search strategies. The users also asked for evaluated information to be
delivered individually. The study revealed that users urge for a centralised information portal in the Internet guaranteeing access to the complete world of medical information. The VML named MedPilot portal was designed and made online since January 2002, that provide access to a number of medical databases, OPAC of the German National Library of Medicine and a collection of more than 1500 evaluated medical links.

A potential model of a digital library was developed by Magnussen (2003), based on the findings of a study on the development of digital libraries in the Commonwealth Government libraries in Australia. The author conducted a detailed literature survey on DLs and analysed the concept of digital library and its activities in detail. The study identified 8 basic components of a DL and some interlinked factors that enabled or hindered the development of digital libraries. Based on this the author developed a model of DL environment with 8 basic components and 9 inter-linked factors that influence the DL. This model was then tested with a previous study of the author on the digital library activities performed by Commonwealth libraries in Australia. It was found that some DL activities were performed by far more libraries than some other DL activities. Based on this the author re-categorised the components of DL as 'core' and 'optional'. The components/activities undertaken by more than 65% libraries were taken as 'core' and others as optional. The factors that influence the DL were found to be equally important in all cases. Finally the author revised and developed the model of the DL environment with the following components and factors:
Core Components- Internet and intranets, electronic publications, electronic document delivery, end-user services.

Optional Components- Integrated access to information, digitisation of materials, resource sharing, library co-operation.

The 9 factors/issues that influence these components were financial, management, client, legal, personal, subject/discipline, organisational, technological and collaboration.

An e-mail questionnaire survey was conducted by Gomes (2004) among Brazilian researchers to study the virtual library and the role it played for the scientific community as an informational and scientific-technical object. The questionnaires were distributed among 9224 researchers who were the subscribers of five different virtual libraries in Brazil and a response rate of 37% was obtained. Respondents were asked about their opinions regarding the reliance on internet resources, particularly the virtual library, in their research. Majority (69%) of the respondents agreed that virtual libraries are the most relevant tool in their activities. The results demonstrated the contribution of internet and these virtual libraries in fostering the scientific communications and productivity of Brazilian researchers.

Wisher (2005) explained the process of building a virtual library for the Touro University-Nevada, a medical university in Henderson, USA. He described how the collection development of e-resources were made. By opting cooperative collection development 50% of the library budget was saved. Sixty free websites of value for its academics were identified from the internet and links were provided in the virtual library. Further he opined that the impact of the virtual library on students was very high
whereas the faculties were bewildered. A 45 minutes hands-on orientation designed by the library was then delivered to the faculties which in turn changed their attitude.

A significant need to plan and implement national digital library for higher education in developing countries was pointed out by Ogunsola and Okusaga (2006) who examined and found out the poor state of academic libraries in these countries. The authors explained the concept, advantages and problems associated with digital/virtual libraries. They opined that for the successful execution of digital/virtual library in developing countries, project administrators and other key staff need to be trained effectively. It was pointed out that resource sharing get promoted with the introduction of virtual libraries. The study recommended the governments of developing countries to allocate sufficient funds for the sustainable development of such virtual libraries.

“The virtual library helps to improve the quality of teaching and research by providing access to tools such as databases, electronic journals, alerting services, online reference tools, and quality-selected web resources”, opined Gbaje (2007). He examined the national virtual library project initiatives in Nigeria and identified the challenges of its implementation. Misconceptions of what constitute a virtual library, unavailability of the basic information infrastructure; poor policy implementation and lack of technologically skilled librarians had been identified as some of the challenges. The study also highlighted the process of building a virtual library, collection development, acquisition and access of electronic resources in the virtual library, and the basic
skills required for the deployment and sustainability of the national virtual library.

Changing trends in library use and management of e-resources were discussed by Wolverton and Burke (2009) from ProQuest/Serials Solutions. The investigators opined that a paradigm shift in library collections has occurred in which e-resources are now the major component of new library materials, requiring new ways to manage and display them. The use of e-resource access and management services was pointed out as a helpful tool, along with federated searching. Authors suggested that by spending less time for processing print materials and ending bibliographic instruction, more time will be available for librarians to market and manage e-resources, which will be of greater benefit to today’s library users.

Virkus et al. (2009) made a literature review on the integration of digital libraries and virtual learning environments (VLE). Eleven documents dealing with both the concepts, published between 2000 and 2008 were selected for reviewing. The authors identified certain reasons for integrating digital libraries and VLEs. The lecturers’ need for creating links from the course management systems to the libraries online holdings, students’ demand for a one stop access to all relevant resources and the IT directors wish to provide a single login interface to access all the resources were the major reasons for the integration. The authors also identified various issues and challenges for these integrations like technical issues, human and organizational issues, copyright issues, etc. Finally the paper discussed the probable benefits of this integration. The major benefits highlighted were quick access to
the resources mentioned in VLEs and more usage of the digital libraries. The authors concluded by suggesting that integration should be the catchword in the design, re-design, implementation, and maintenance of digital libraries and VLEs.

Wei (2011) briefly discussed the concept of Open Source Software (OSS) and its applications in libraries. The study revealed that over 67% of the web servers around the world use OSS. The author opined that libraries are the frequent users of OSS and many of the library services are delivered through the application of OSS. Further the paper gave a brief outline of different OSS used in the libraries for the development of institutional repositories, digital libraries and integrated library management systems. The features of Greenstone, DSpace & Eprint were then discussed briefly. Finally the paper pointed out some problems related to the implementation of OSS in libraries. The scarcity of high-quality expertise among librarians in handling the software was raised as the major problem. The author remarked that while implementing OSS in libraries librarians should be vigilant about the licenses, standards and legal risks.

2.3.2 National Studies
An exhaustive coverage of various digital library projects in India developed by higher education institutions, parliament and other governmental and quasi governmental bodies, private agencies, etc was given by Jain and Babbar (2006). The paper pointed out the features of the recommendations of the National Task Force on IT and Software Development (2003) for development of DLs in the country. Further, the problems of digital libraries in India were discussed in the paper. The
lack of interest on the part of parent institutions and the absence of action plans or priorities were found to be the major hindrances towards the development of digital libraries. Another problem was the acute shortage of competent personnel to take up the task of digitizing local content and creating digital information repositories. The authors opined that the responsibility of envisioning, developing and sustaining functional hybrid and virtual library and information systems and services rested on the library and information professionals.

Deb (2006) conducted a case study to describe the development and functioning of the digital library of The Energy and Resources Institute (TERI), India. The author pointed out that the DL provided a single window access to all digital and digitized contents of the library. All the electronic resources were made accessible using linkages with a single click to its location in a database or in their virtual collection. The study identified that this integration helped the researchers to save their valuable time. Library management was also found to be easier and effective as a result of this. The future plan of the DL project mentioned in the paper was developing a highly interoperable platform that enables cross-database searching and retrieval through a single interface. The author remarked that future libraries have no escape from such an integrated digital library approach.

The digital library initiatives at higher education and research institutions in India were discussed by Varatharajan and Chandrashekara (2007). A brief description about the various digital libraries developed by different higher education institutions and R&D organisations in the areas like traditional ayurvedic knowledge,
manuscripts, science and technology, ETDs, etc were discussed in the paper. The study envisioned an Indian information infrastructure linking education, research, government, and business with the participation of state and national governments. The paper stressed the need for clear-cut national plans and polices for infrastructure, standards, metadata, interoperability, multi-lingual databases, training, co-ordination, copyright, and archiving and preservation methods.

The perceptions and use of the digital library of Cochin University of Science and Technology (CUSAT) by its undergraduate engineering students were examined by Sheeja (2010). A questionnaire survey was conducted among 225 undergraduate students in 7 branches of engineering and received a response rate of 89%. The paper gave a brief description of the digital library of CUSAT. It was found that 98% of the respondents were aware of and used the DL. The main purposes for the use were identified as downloading previous years question papers and syllabi. A vast majority of the respondents opined that the browse and search facilities were easy to use and were satisfied with the DL. Majority (76%) of the respondents were of the view that the DL helped them to improve their performance. The author suggested expanding the services of the DL by including more collections related to the course of study. Another recommendation was to provide proper training to the students on the effective utilization of the DL.

The need for the development of National policy for digitization, co-operative subscriptions and user centered policies and strategies were stressed by Ramesh (2011) for the sustainablility of the DLs in India.
The author explored the digital library initiatives undertaken by the government and other organizations in India. The paper gave an exhaustive coverage of various DL initiatives in different disciplines like art, manuscripts, engineering, public administration, women studies etc.; and DL initiatives on different types of resources like ETDs, manuscripts, etc., functioning successfully in the country. The author identified certain problems associated with these initiatives. A major problem pointed out was the lack of clear cut national level policies that support the sustainability of these DLs. Lack of OCR facilities for multiple Indian languages and non-availability of well-trained skilled personnel were some other problems identified.

2.4 Observations Based on the Review
The following observations are made from the literature review. The developments in the subject fields are listed down in a chronological order.

1. Use of e-resources and services & resource sharing and consortia are the widely discussed areas in the field of librarianship. Whereas design and development of digital libraries and virtual libraries is a developing field and hence relatively lesser number of publications have come out in this area.

2. In the beginning of 2000s the use of e-resources and services was comparatively less and studies recommended campaigns for the promotion of e-resources.

3. In India, consortial subscriptions of databases took impetus in 2003-2004. But the services were made available to the IITs, IIMs, and centrally funded universities.
4. In the second half of 2000s, the availability and utilization of e-resources in IITs, IIMs, and other centrally funded institutions were comparatively high.

5. By this time a shift in preference towards e-resources became evident in academic libraries around the world.

6. The activities of resource sharing consortia in different discipline were extended to more number of institutions which in turn improved the availability, acceptance and use of e-resources among academics.

7. Studies related to the use of e-resources and the impact of consortia occupied the professional literature.

8. The demand for special type of consortia for different types of institutions started emerging and many studies proposed models and prototypes for the same.


10. In the field of design of DLs/VLS Indian studies are comparatively less.

11. Regarding the studies on engineering college libraries, a lot of studies have come out from different states of the India. But from Kerala only one study has come out in 2007. The study revealed that the librarians and academics of engineering colleges in Kerala are in favour of a resource sharing consortium.

12. No comprehensive study has come out on the availability and use of e-resources in the engineering college libraries in Kerala.

### 2.5 Conclusion

A sincere effort has been made to identify, locate, collect and evaluate relevant literature in the above mentioned concepts. The review helped to make a clear understanding of these concepts and the
tools used for collecting and analyzing data. The gaps in the studies are also identified. The review leads the researcher to the following conclusion.

**Resource Sharing** → **Availability of e-resources** catalyses

**Availability** → **Demand and Accessibility** catalyses

**Accessibility** → **Productivity** catalyses

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