

Knowledge Management and Electronic Theses and Dissertations in Libraries : Perils and Solutions in Indian Perspective

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Abstract : *Information and Communication Technology (ICT) is a great facilitator for Knowledge Management (KM). ICT enables to create digital repositories for sharing knowledge transcending many of the existing limitations. Digital repositories are one of the components of Knowledge Management in libraries. Digital Repositories of in-house research are becoming priority items in most of the universities and research institutes. This paper highlights the major challenges in creating a digital repository of Electronic Theses and Dissertations (ETDs) for universities/academic institutions. Authors suggest solutions for the constraints identified for ETD initiatives and conclude that the library professionals should take up the problems by solving the constraints. based on research in this area of Knowledge Management in Libraries.*

Keywords : *Knowledge Management, Electronic Theses and Dissertation, Open Access, KM, ETD, OA.*

1. Introduction

Universe of knowledge is rapidly changing its form, process of creation and organization as well as mode of dissemination and accessibility. Transition from traditional paper based materials to digital materials has changed the expectations and information needs of the user community. Accordingly, traditional libraries now hold electronic and digital materials accessible to the public. Knowledge is the organized body of information and is the creation of human mind. It is dynamic in nature and multidimensional in size and has to be evolved through time and is used by the society. According to Dr. S. R. Ranganathan, knowledge is a sum total of information conserved y civilization. Quality

library services are imperative in knowledge society as it inspires the knowledge workers to be innovative, viz. think globally and design locally.¹

2. KNOWLEDGE MANAGEMENT (KM)

Information and Communication Technology (ICT) enable to universalize knowledge and information. Increase in circulation of information is taken care of by the information systems and the knowledge revolution is inspired by new information systems. Knowledge involves thinking with information. One of the most practical ways to do this is to build communities that cross teams, disciplines, time, space and business units. ICT infrastructure for communication and sharing of information is a common parlance in Indian institutions. Encouragement

by organization for capturing, generating and converting tacit knowledge into explicit knowledge by electronic, print, audio-visual means, evolving open corporate culture that enables KM etc. can be termed as KM culture.

Exponential growth of knowledge has invited management concepts in LIS also. KM is relatively a new concept and method of management. It is difficult to give a single definition since the concept is taken in differently by different people from different domains. KM is the management technique which aids to create, capture, organize, utilize and share the knowledge so as to improve services in the knowledge economy. World Bank defined "KM as the management of knowledge through systematic sharing that can enable one to build on earlier experience and obviate the need for costly reworking of learning by making the same repetitive mistakes".² KM entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge.³ As per KM Concepts, theses and dissertations (T/Ds) are considered as imprint of both tacit and explicit knowledge. Creating repository of electronic T/Ds are a means of KM for further research as well as application of results of research in society. KM is to be considered as the best way to control the difficulties associated with the access of knowledge due to its exponential growth, especially in the digital era. In this era, ICT is a great facilitator of KM

3.ELECTRONIC THESIS AND DISSERTATION (ETD)

Theses and dissertations (T/Ds) are the

results of academic research and are the unique sources of information for further research. They were not available in the public domain before. Only the universities and the scholars had the copies of the research works, and were normally in a locked condition and accessible to limited users only. It is socially un-justifiable to keep research works hidden from public access and also, wastage of public fund expended by the State for the research works. Electronic Theses and Dissertations (ETD), many a times are the sub-sets of local institutional digital repositories of documents. ETDs expand access and visibility of doctoral research and provide a platform for researchers to both deposit and make their work accessible worldwide.⁴

The home of the ETD effort is Virginia Tech University, and the person at the center is Edward Fox, a Professor in the Department of Computer Science. He began the NDLTD, and now, Virginia Tech has over 2000 of its students' ETDs 'online'. Another leader is the Massachusetts Institute of Technology (MIT), which has put more than 4000 dissertations online. MIT has taken a very pragmatic approach. Since it was already duplicating dissertations to sell for those who request them, MIT decided simply to digitize them, based on demand, for online access as part of the process. Now about 50 percent of the dissertations requested have already been digitized.⁵

Development of ICT and dramatic changes in the digital technologies inspired the library professionals to provide technology oriented and uninterrupted access to the information sources in digital format. To provide such an access to the inaccessible intellectual work, the concept of Electronic

Thesis and Dissertation (ETD) has emerged.

3.1. INDIAN SCENARIO

In India, over 3000 crores of rupees is invested every year for generation of knowledge.⁶ Till now, T/Ds resulting from these knowledge generation processes for obtaining PhDs were kept in-house. The trend is now changing towards opening up this primary source of information to the public for their scrutiny, assessment and assimilation. Concerted effort of UGC and other academic governing agencies contribute towards this trend.

According to UGC Regulations, 2005 on 'Submission of Metadata and Full-text of Doctoral Theses in Electronic Format'⁷ each university shall make the submission of electronic version of the doctoral thesis a mandatory requirement for all doctoral students. This could be introduced in the universities by modifying the existing Ph. D regulations of universities by adding a clause on "Submission of Theses". There are 26 steps involved in the process of implementation of ETD. However many of the Indian universities have not been following UGC regulations. UGC realized the lack of a comprehensive database of doctoral theses submitted to the universities in India. By understanding the importance of the ETD, factors such as lack of an appropriate policy framework; implementation mechanism; standard system for submission and archiving of T/Ds, UGC evolved a regulatory policy and an implementation mechanism for maintaining standards, archiving, and accessing doctoral research output of Indian universities. Moreover the concept of open access and ETD has brought in a sea-change

in the academic, research and development fields. ETDs are gaining momentum in India and the notable efforts are Shodhganga of INLIBNET, Vidyanidhi of Mysore University, MGU Theses of MG University, Kottayam to provide online access to the publicly funded research to the user community.

ETDs facilitate timely access to multiple users without any geographical barriers. Repositories of ETDs are playing an important role in the dissemination of information. International initiative such as NDLTD has made large impacts on the creation of ETDs in India. However, there is no full-fledged mechanism to access the bibliographic details and full text of T/Ds in a single interface in India. ETDs in India suffer from a range of issues such as technical, technological, financial, legal, manpower and above all, will of the governing bodies of the Indian Universities in implementing it. Presently these collections in India remain as restricted collections in the university libraries, only to be used by academic community from inside. Reach of research is not even one percent among their expected users.⁸ Many of the projects could not meet the goal of a real ETD and most of the universities and institutions have not started their Open Access ETDs. There are many issues that are to be streamlined to meet the goal of an ETD such as ownership, copy right, plagiarism, access limitations, long term preservation, publishers view, cost of hardware, software, infrastructure and maintenance. Online access to ETDs are far from reality and national initiatives such as Shodhganga and Vidyanidhi account only about 3 percent of the PhD dissertations produced in India.⁹ However, national ETD initiatives are still in developmental stage where more action plans are needed. The

only official repository of any university existing, MGU theses has covered only 70 percent of its dissertations completed in the first phase. Even though university committed on uploading dissertations within 14 days of acceptance, not even a single dissertation has been uploaded during the last one year. Of the 450 universities in India, 99 percent have not come forward with an official OA archive of their dissertations. Due to lack of access to T/Ds, public funded research remain inaccessible and hardly useful to the society.¹⁰

4. KNOWLEDGE MANAGEMENT (KM) AND ETD

Knowledge Management (KM) deals with managing both tacit and explicit knowledge. T/Ds are the store of tacit knowledge and are difficult to formalize since it is linked to the experience of people. It is explicit also since it needs to be managed as much as tacit subject knowledge. Knowledge acquisition, sharing and utilization, sharing and utilization are the major components of KM. KM entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories and to cultivate and facilitate the sharing of knowledge.¹¹

ETDs are very important in this age of Knowledge Society and as a component of KM. It facilitates the users to access the resources and promotes scholarly communication, simultaneously increasing the standard of the university and worthiness of the library services. Thus, Open access to research maximizes research access by its wider circulation and thereby enhances the research impact, making research more productive and effective. One of the big

benefits of almost all kinds of technology-based communication is that it can be archived electronically. The resulting archives can be valuable for very different purposes related to KM; for the author's or recipient's own reference, for sharing with others, for optimizing the system design or configuration based on actual usage patterns, and for expertise profiling.¹² ETDs are for managing the knowledge and archiving them efficiently for global access.

4.1 OPEN ACCESS (OA)

Theses collections in India remain as restricted collections in the libraries. Most of the developed countries have created online databases where universities as well as researchers upload their dissertations. They provide Open Access to their doctoral dissertations. OA is free, online, full text access to materials in digital form to any user from anywhere at any time over the web. OA enables users to link, read, download, store, print, use and data mine the digital document/material free of copyright restrictions for academic purposes. OA is thus very important for developing countries, which cannot afford costly journals in which current research is published. The main aim of OA is to make publicly funded recorded output of research freely available for the benefit of the society. The Internet and permission of the author makes OA possible.

5. METHODOLOGY

5.1. Objectives of the Study

The main objective of the study is to identify the challenges and problems in creation, maintenance and providing access to ETDs and to render solutions to overcome

or minimize the problems in ETD initiatives based on KM activities in the libraries in India.

5.2. Selection of Sample

Fifty numbers of libraries of universities, R & D, management, S & T institutions which have made impact in creation and maintenance of ETDs in different parts of India on purposive sampling method have been selected for the survey of the study.

5.3. Data Collection

In this study both the primary and secondary data are used. The secondary data are collected from published and unpublished documents. Primary data and information on select variables are collected by means of a well-structured Questionnaire built as Google Document and sent as e-mail to the sample respondents. The Questionnaire was revised after conducting a test trial of sample of five institution libraries.

5.4 Analysis

The responses have been coded by the Google Document and the analyzed results have been given as charts and graphs. These outputs have been used for this study. Twenty Four institutions have responded to the questionnaire, achieving 48 percentage of response rate in data collection. Responses were collected and the suggestions put forth by the professionals were analyzed to formulate the findings and the recommendations of the study. Literature survey, content analysis of some ETD websites has also been relied for the study. List of institutions responded to the survey is given at Table 1.

Table 1 : List of institutions participated in the survey

1	CSMCRI, Bhavnagar
2	Delhi University, Delhi
3	DMRL Hyderabad
4	Goa University, Goa
5	IFMR, Chennai
6	IHMR, Bangalore
7	IIM, Ahmedabad
8	IIM, Kozhikode
9	IISc, Bangalore
10	IISER, Mohali
11	IIT, Mandi
12	IIT, Ropar
13	JIIT, NOIDA
14	JUIT, Solan
15	IBS, Hyderabad
16	Krishna Kanta Handiqui State Open University, Guwahati
17	NML, Jamshedpur
18	PRDC, Bangalore
19	S K R Engineering College, Chennai
20	S.K.N.Sinhgad College of Engineering, Nashik
21	Symbiosis International University, Pune
22	TAPMI, Manipal
23	V V College of Engineering, Tirunelveli

6. CHALLENGES

There are many technical and administrative challenges to be regulated in creating, customizing, maintaining and making the repository of ETD collection accessible. The challenges can be social, institutional, technical, digital, access and policy issues and many, though they have a positive impact on all these areas. Some elements are free from any ambiguity but others are not so. Some major constraints which are identified during the study and the possible solutions are discussed.

6.1 Lack of Standardization

Getting an electronic copy of dissertation is not a hard step, but ensuring the electronic submission in the required format and standard is really hard¹³ Responses received from professionals show that the people are aware of the concept of KM and ETD and also support its significance in libraries. There is a lack of standardization in the selection of software, metadata, content types, file format etc. It is visible from the response that different libraries follow different metadata standards for their collection.

Lead role can be done by UGC, INFLIBNET, DELNET and other prominent Library and Information Networks in formulation and implementation of standards of ETDs. Workshops and training on electronic publishing using PDF, tools like Word Exchange, LaTeX; online submission of theses; searching and browsing etc imparted to the personnel involved in ETD activities shall ensure standard operations in ETD initiatives. The implementing agencies may also concentrate on one or two software so that the professionals can be made

specialized in that software and can manage ETDs by sharing their knowledge and expertise in a network environment.

There should be a standard metadata format for uniqueness and uniformity on ETD repositories. Selection of suitable metadata standard, process of metadata extraction and injection, Open Access Initiative (OAI) compliant, its ability to incorporate with the state-of-the-art developments etc should be considered during ETD initiatives. Dublin Core Metadata Initiative (DCMI) is considered to be one of the widely accepted and utilized metadata standards suitable for the creation of ETDs. ETD-MS, published by the Networked Digital Library of Theses and Dissertations, is a Dublin Core-based metadata standard with a low barrier to entry and broad application, focusing on repository interoperability.¹⁴

6.2. Technical Issues and Maintenance

There are many technical and technological issues, which are needed to be resolved prior to the adoption and creation of ETD. Analysis of data collected reveals that the library professionals are lacking in technical knowledge on installation, customization, updating and maintenance of ETD software. In many of the institutes, it runs on personal interest of library professional, computer professional or a faculty member without training the first and the second line personnel which could be disastrous. Issues related to skilled manpower, use of hardware and software etc also remain to be addressed.

Mere knowledge in the technical aspects makes the library professionals to constantly depend tech savvies to solve problems in the

management of ETDs. An array of personnel, trained on installation, customization, updating and maintenance of ETD software among the professionals will serve the related problems. There are many workshops and training programs organized all over the world, facilitating to learn about ETD software. Professionals have to be updated with the software knowledge frequently and should be able to configure the software, and justify the selection of hardware and software (in-house/open source), and also design the IT infrastructure according to requirement of the user community. They should be able to customize the software if it is not sufficient to meet the complex needs of the ETD process. Professionals are to be trained tech savvy in the ICT components and ETDs.

6.3. Absence of policies, rules and regulations

Analysis of data shows that there is absence of national level policy guidelines for the development and promotion of ETDs. UGC enacted 'Submission of Metadata and Full-text of Doctoral Theses in Electronic Format Regulations-2005' has created awareness on ETDs as well as generated interest and provided some standards to creation of electronic dissertations in universities. It is after about 10 years that a university in India came forward developing and testing a successful Full Digital Library of Theses. But that went without any follow up after the expert who managed the project went out of that institution.¹⁵

UGC proposed two sets of planned actions in its 2005 regulations 1) Creation of Indian National Theses Database (INTED) and 2) Submission of PhD Theses in electronic form. However, these UGC directions still

remain unrevoked. Our universities should take a proactive role in the implementation of these regulations. They have to accept T/Ds in electronic format besides its print, for having electronic format of T/D is the first step towards RTD repository. But even now the importance and benefits of ETD have not been percolated down to the scholarly community and the library professionals or the university fraternities. Standard policy for establishment of open access on ETD repositories is also lacking in India. A national level policy should be framed regarding submission of dissertations in electronic form and regarding maintenance of OA Repositories. A National Network of Digital Archives of Doctoral Dissertations in traditional universities, agricultural universities, Indian Institutes of Technologies, IISc and other research institutions can be thought of and it can be on INFLIBNET, NIC or Vidyanidhi Project or even their joint project.¹⁶ Electronic submission of the dissertation should be made mandatory by the universities in India.

6.4. Lack of expertise at users and professional levels.

Study reveals that there is a lack of expertise on different aspects of ETD in user level as well as library professional level. It is mandatory to introduce the concept of ETD to the user community by conducting training programs and seminars. Online tutorials, Seminars, training programs, lectures etc can generate awareness among the scholars for participation and utilization of ETDs. Active programs on ETD of international scope are regular on half yearly or yearly basis in foreign countries to promote their ETD works.

Researchers should be introduced with the aspects of ETD, formulation of the

electronic form of their T/D works, and they should be taught of inclusion of text, images, hyperlinks, multimedia objects and PDF conversion, Copyrights and proprietary rights, searching on databases etc. Researchers can be given a 'dummy' form to practice submission of ETD during their course work. Course I of Ph D curriculum framed by UGC should include all aspects regarding, Library Classification, Subject Indexing, Thesaurus, ETD, UGC Regulations for T/D submission, metadata schemes, ICT and its application in a well organized and practical way in the curriculum to adapt the technical and technological savvy to the younger generation. Initiatives in this direction are yet to be spotted in India.

ETD initiatives lack luster with regard to the number of documents digitized. However, it is worthy to note the simple initiatives taken up by the institutes making repositories with very limited numbers of documents as a KM activity in the libraries. Fig I gives the range of documents in the repositories.

6.5. Familiarization Programmes

Training programs make the library professional to improve their ICT skills and adaptive to the technological changes. It is advisable to prepare manuals and FAQs which comprise information on specifications on the submission format for ETD to assist the researchers. UGC can initiate seminars/ training for promotion and development of ETDs in India. A model programme that can be sited is the "National Workshop on developing Digital Libraries of PhD Theses using Nitya Archive" conducted by MG University. It is suggested that the training programs should concentrate on the following aspects :-

- Selection of Software, Hardware and Server
- Selection of metadata standard and the process of metadata extraction, injection, harvesting etc.
- Easy, simple and user friendly mode of submission of T/Ds with minimum steps
- Knowledge of technical skills in installation, maintenance, customization access improvement mechanisms
- Knowledge of operation systems like Linux, windows, UNIX
- Creating customized searching and browsing options
- Designing of IT infrastructure and content management
- Classification schmes etc.

6.6. Size of ETD Repositories

The size of collections in the organizations surveyed varied from less than 100 items to above 5000. The following chart depicts the size of collection in different libraries.

Table 2 : Range of documents in Repositories

Sl. No.	Range of Collection	No. of responses	% of response
1	1-100	5	29.4
2	101-500	3	17.6
3	501-1000	2	11.8
4	1001-5000	5	29.4
5	Above 5000	2*	11.8

*1. Delhi University 2. IIMA (IIM Ahammadabad)

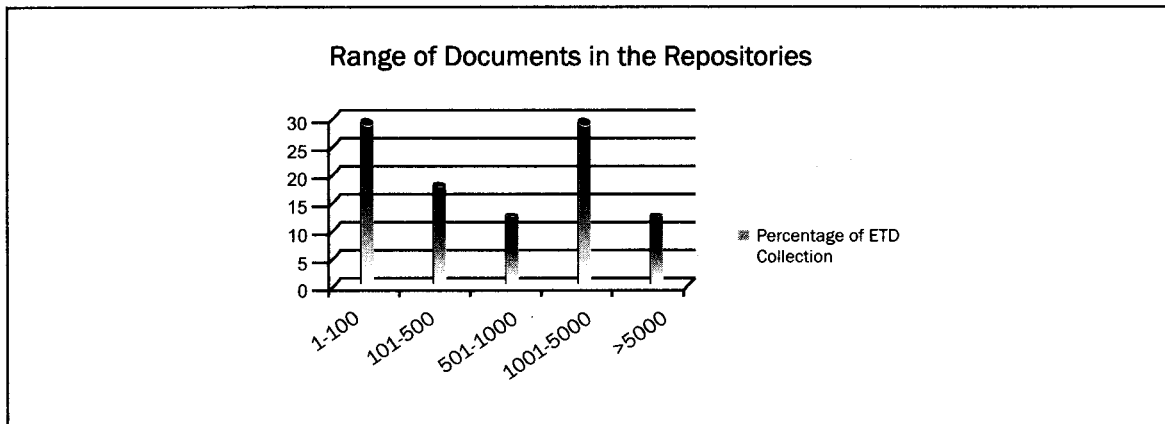


Fig 1 : Range of documents in teh repositories

The libraries having 1-100 documents comprise of 29.4%; 101-500 (17.6%); 501-1000 (11.8%); 1001-5000 (29.4%), and Above 5000 (11.8%)

6.7. Copyright Issues

Provision of wider access to the full text ETD within the campus (Intranet) or to the public (Internet) involves copyright issues. There are no hard-and-fast rules regularizing which materials can be used without permission. ETD is a published work. Therefore the permission must be obtained from the copyright holder(s) such as research scholar/guide/university when the contents are used. Lack of knowledge in copyright issues is another challenge faced in ETDs. Many organizations in India are not openly providing access to their ETDs due to lack of knowledge of IPR/Copyright. The survey conducted for the study revealed that 45 percent of the respondents were not well aware of the copyright issues. This is one of the reasons for the authorities to keep knowledge resources as such and for not taking any effort to convert it into digital form. The

copyright aims to protect original works of authorship. This is seen forgotten or made as an excuse by the authorities in implementing ETDs in the institutes.

OA to doctoral dissertations is now an important topic of discussion among faculty members and research scholars worldwide. Copyright law needs to be reformed by shortening of the term, reducing permission barriers etc. After these legislations are opposed by publishing industries.¹⁷ Dissertations do not carry publishers' investment. In India, however, about 3% of the dissertations only are becoming openly accessible. A mission mode project by UGC, backed by the recommendations of National Knowledge Commission that support open access to public-funded scholarly literature, can deliver Open Access ETDs in India.

Since there is relatively great chance of infringement on the published work because of the availability of content on the open web via ETD repositories, the author/institute should register their work for copyright which can be a significant benefit for the protection

of the work. Copyright aspects are to be introduced to the scholars well in advance to the dissertation stage and should have protocols for handling digital T/Ds. In US, as soon as a scholar saves a draft of the thesis or dissertation on paper or computer it automatically copyrighted under U.S. Federal Law (United States Code, Title 17). The scholar or university do not need to apply for its protection, and it lasts for the span of lifetime of the scholar plus 70 years and the scholar can retain the right to his work until, or unless, he transfers it to another party. The same law should be implemented in India also. Implementation of copyright law provides an important opportunity for libraries to help educate students about copyright. Organizations should make their researchers aware about existing copyright laws and implications of third party material available in theses. The copyright of the original work does remain with the researcher. Researcher should assign rights to the University for publishing their T/Ds online.

6.8. Plagiarism and Quality issues

One of the objectives of ETD is to prevent duplication of efforts of scholar's work and to enhance quality of his research work. Increase in plagiarism pull the researchers back from keeping their intellectual output in a publicly accessible platform where the copyright of the content is highly possible. In the case of a print-only publication it is very difficult to detect plagiarized portions, ideas and work until and unless the creator or those associated with the original work come across with it. There is a fear among a few that if university places doctoral dissertations in open domain, research of inferior quality will be exposed to the world causing damage to the

reputation of the institution and the scholar.¹⁸

The survey reveals that the professionals are aware of these problems and hopefully like to prevent it with the help of ETDs. The chance of plagiarism is similar either the dissertation made available electronically or in hard copy in an open access environment. However, electronic copy of theses are much easier; more effectively searched and provides effective dissemination of research output than traditional paper versions.

The benefits of technology-based communication are immense. Open source software that detects plagiarism is now available over networks. By creating awareness on free software that detect plagiarism and educating on its use among the scholars and researchers, trend of plagiarizing could be checked successfully.

Hoarding of information is a style of yester years. Creating value by making information not available to the users has changed to a model in which they freely provide information. Universities that boast with number of dissertations in the bookshelves no longer hold value. Transparency of information is the most valued attribute of the knowledge society. Universities in the developed countries provide OA to their doctoral dissertations. However, these trends of a knowledge society are yet to be sensitized in the Indian universities. As Open Archives Initiative (OAI) is becoming popular in academic and research institutions worldwide, there shall be no option for Indian Universities other than becoming OAI and implementing ETD. Universities like Pondicherry University already made it mandatory to check the percentage of plagiarism using software, TURNITIN and the no-due certificate will be

issued only based on the TURNITIN document ID. All electronic T/Ds must be made available to the public for plagiarism detection purposes. Awareness towards plagiarism must be staged and it is feasible to provide anti-plagiarism software to both the scholars and the universities to check their T/Ds before they are uploaded to the repository. Temporary embargo placed on the thesis which will delay the thesis being made open access for a maximum of five years would avoid any misuse and would allow time for researchers to document the thesis properly and publish research findings. Enabling the "No Content Copying or Extraction, Disable Accessibility" option in the Adobe Acrobat will prevent a user from copying text and graphics from the PDF file.

6.9. Quality of Metadata

Metadata means 'data about data' and is all the information that describes the ETD.

The administrator should also ensure quality of the resource in each stage in terms of its legibility, visibility, relevancy, contents, format etc. Electronic form offers very less problems in this regard. In addition to it, emergence of OAI (Open Archives Initiative), which helps to develop and promote interoperability standards that aim to facilitate the efficient dissemination of content.¹⁹

Data analysis revealed that institutes prefer to use either OAI-PMH or ETD-MS or both and it is revealed that some institutes follow more than one format for harvesting their metadata and there is no single format for metadata harvesting. Fig 2 depicts the percentage of metadata standards that are followed in different repositories.

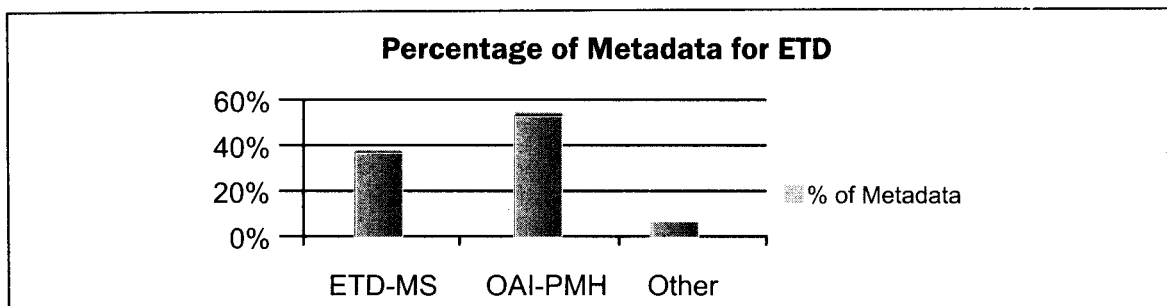


Fig 2 : Metadata followed in ETDs

Among the libraries surveyed for the software used to build ETD, it is found that D-Space constitutes 56%, E-print 9% and Other software constitute 35%.

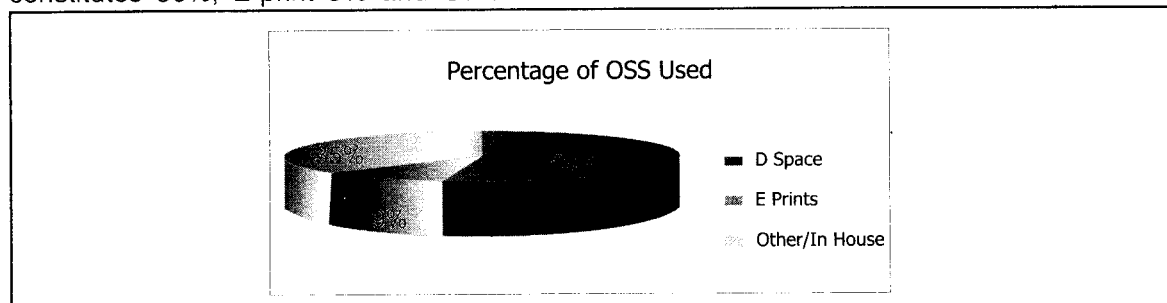


Fig 3 : Percentage of OSS used in ETDs

The libraries use different formats for keeping the documents in the repositories. Fig 4 sums up the data on formats used.

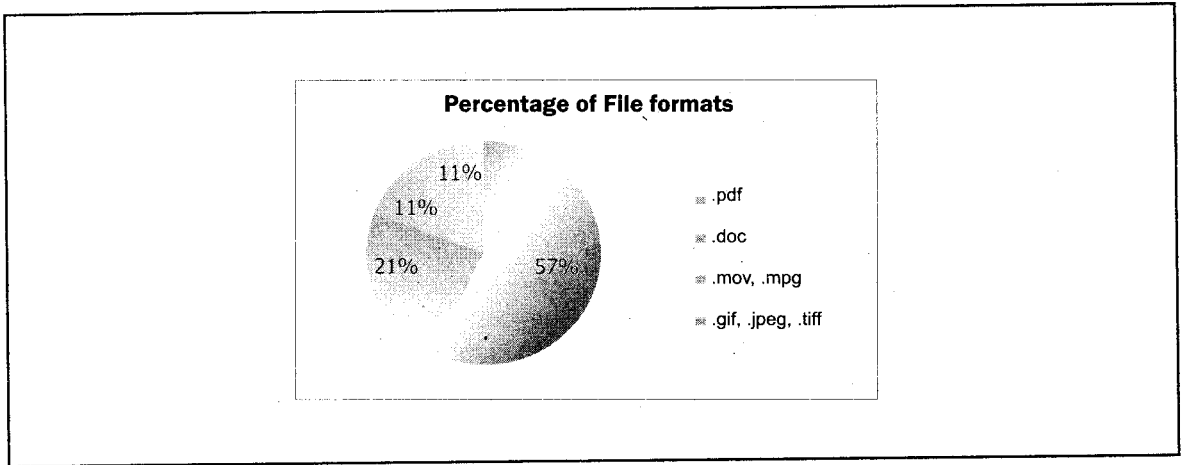
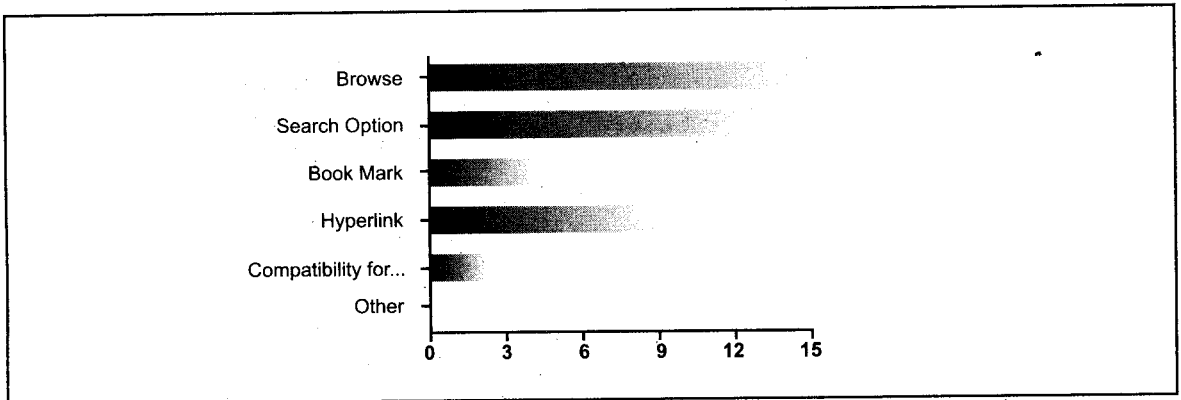


Fig 4 : File formats used in ETDs

It is found Pdf is used in 57% of libraries; .doc (21%); .mov .mpg, or .avi, .gif, .jpeg, or .tif are (11%). Formats such as aif, .midi, .snd, .wav, or as CD-DA, CD-ROM/XA, or MPEG-2 and others have shown 0% for file formats used in ETDs.



Browse (88%), Search option (82%). Book Mark (24%), Hyperlink (59%)
 Compatibility for data processing in MS Word/Excel Etc. (12%) Other (0%)

Fig 5 : Options incorporated in the stored documents

It is required to follow national and international standards and guidelines to maintain the overall quality in the metadata collection of an ETD. Metadata has to be described in a standard way in the initial stage of ETD creation. ETD-MS and OAI PMH are the best-known standards for ETD since it provides a set of core metadata elements in a systematic mode for creating, submitting and discovering the resources. Survey respondents indicate that the selection of metadata standards change according to the policy of the institutes and the metadata formats presently in force is OAI PMH.

Analysis shows that 56% of the institutes follow OAI-PMH format for harvesting metadata followed by 38% of ETD-MS format. Remaining 6% follows other standards for

their ETD.

The study revealed that Quality of metadata formulated is a decisive factor in the creation of ETD. Library Professional bearing the responsibility of Administrator in ETD initiatives are to check specified formatting standards. It is revealed that OAI-PMH is the preferred format for ETD initiatives in India.

Indexing ETDs in Google Scholar, Yahoo, Scirus etc increases the coverage. Easy retrieval and the visibility of the ETD on the web depend on the quality of the metadata input during submission. The process of ETD submission should be quick and simple. All the libraries/institutions responded to the survey indicated that they are part of network, one or the other.

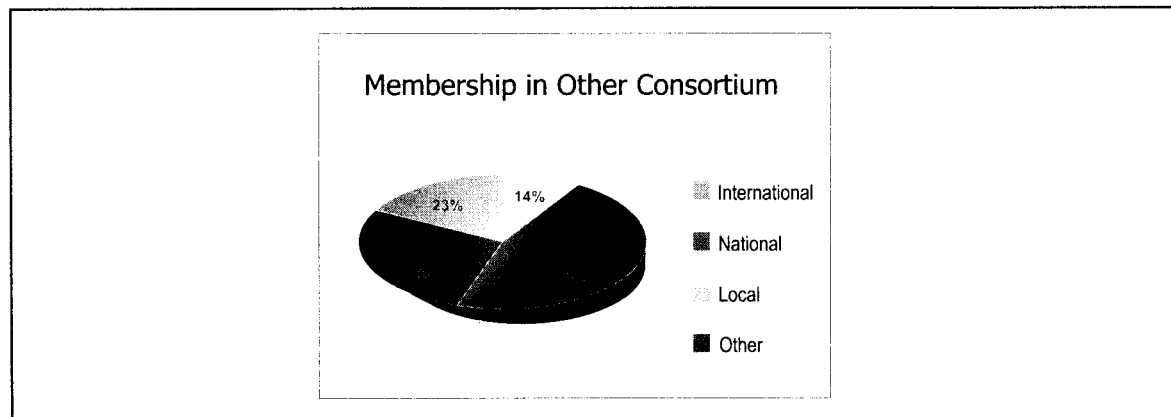


Fig 6 : Membership in networks/consortium

It is found that 14% of the organizations are the participants in International Consortium, 45% in National Consortium, 18% in Local information networks and 23% in other consortia.

6.10. Digitization of Retrospective Theses and Dissertations

The approach and steps involved in the process of converting paper-based documents into digital formats varies and depend on policy, infrastructure, usage,

availability of resources, manpower etc of the institution. In the light of the principles for building good digital collections, planners of retro digitization of T/Ds need to consider various issues and value-added services that facilitate management of the digital content

and make it more visible, accessible, usable, reusable, interoperable, and persistent.²⁰

The study reveals that one of the main problems with retrospective conversion of T/Ds is mainly associated with the Scanning of documents. Many institutions have pointed out the difficulty in procuring high-end scanner which is essential for quality scanning. Many times, it is not cost effective to procure a high-end scanning machine for an individual library. Instead, it is feasible to share the expenditure or adopt the service from other institutes. Now-a-days, Digital Cameras are increasingly being used by the libraries for digitization of documents. Indian Institute of Technology Kanpur availed the scanning facility of Indian Institute of Information Technology Allahabad for digitizing their 900,000 pages of T/Ds.²¹ MG University outsourced the scanning work to an expert group.

The Standards for digitization is another area in which more time and effort is required to keep the uniformity of the digitized contents with the same resolution. Utilization of high-end scanners eases the issue to some extent. Continued access and long-term preservation of the digitized materials are the other aspects that need attention. Old, mutilated and rare documents need special care and personnel are to be trained on preservation and care of such documents. Many institutes lack infrastructure and manpower in this matter. The problem is very critical in completing the mission taken up for digitization of rare documents as there is narrow or no chance to get an alternate copy of the document.

Other problems associated with digitization are that it is a time consuming process; lack of financial support for

digitization, lack of manpower and lack of optimization. These problems usually cut back the process of digitization in the institutions. Many of the respondents agree that the University/Institutes lack long term access and preservation policy and long-term commitment to maintain and update the data.

UGC Regulations 2005, to some extent, solves the problem of conversion of print format to digital one. For retrospective conversion, out sourcing of the digitization process or availing the scanning tools from other agencies can be termed as a good alternative especially in the libraries that do not have skilled personnel and equipments for digitization. Universities can also communicate with the research scholars in obtaining digital copy of their works before resorting to conversion because dissertations are born digital now-a-days, though the universities lack policy on receiving a digital copy.

6.11. Financial and Technical Guidance

Budget is the main constraint in initiating any project in the libraries. Adoption of Open Source software for implementation of ETDs shall bring down expenditure on software. However there would be some finance involved in the hardware, networking facilities and managing ETD collection. The study revealed that 65% of the institutions have adopted open source software. Commercial/proprietary or in-house developed software share the remaining portion.

Selection of appropriate software for building an ETD is of prime concern. Most of the problems associated with the software can be solved by using open source software instead of developing in-house software. Open source software have enough support, literature and

expertise, it is experienced. The use of open source software for ETDs and imparting training to library staff may be the model best suitable for majority of universities.²²

The study revealed that DSpace -- the open source digital library software, is the most popular software used for ETD programs in most of the institutions. Training programmes and workshops could make the library professionals to acquaint with the open

source software and its applications in library. Hands on training programs can further make them technically skilled in handling the collection. Memberships in online forums, online tutorial etc will help the professionals to clear up their uncertainties and doubts in real time. Collaborative and technical support and financial assistance from other organizations with similar work could be the alternative sources to overcome the financial constraints to certain extent.

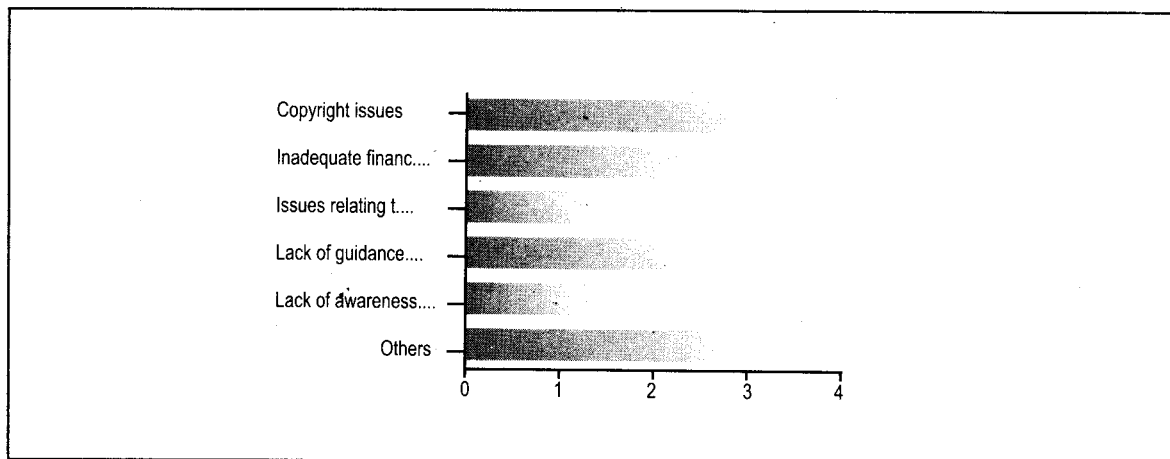


Fig 7 : Reasons for not initiating ETD

On the constraints in developing ETDs, the study finds that 31% are born by Copyright issues, 23% by Inadequate financial sources, 15% by Issues relating to plagiarism, 23% by Lack of guidance and training, 15% by Lack of awareness among both librarians and management and 31% by Other constraints.

7. OTHER CHALLENGES

Other challenges associated with initiation of ETDs are :-

7.1. Multi languages in India

Though English is the predominant language of Indian T/Ds, there are T/Ds produced in Indic language/scripts. Documenting the multilingual and multi-script

databases of T/Ds is one of the major issues to be resolved. One is to follow the transliteration approach, i.e. irrespective of language of the theses; the bibliographic records would be in Roman Script. The other is to describe the theses (metadata) in the language of theses.²³

There is only one project in India that successfully managed the full text retrieval

system in Indian languages and scripts. The project used Nitya Archive software and launched the first official ETD repository of any Indian university in 2008.²⁴ Multilingual and multi-script problems can be settled by implementing UNICODE, the standard which supports all of the world scripts. Today most database products and applications support UNICODE.²⁵ ETD of Mahatma Gandhi University uses UNICODE compliant exclusive commercial software, Nitya D'Arch, facilitating archival and retrieval of any of the Indian language by using its local script. This bibliographic cum full text retrieval system has the capability of multilingual search, which lacks in many of the ETD software. It is capable of performing deep indexing and retrieves specific pages in which the query term occurs from multitudinous pages. It facilitates multilingual data input and query building. The software can host any number of dissertations in English, Malayalam, Hindi, Sanskrit, Tamil etc. MGU Theses also have an option for query building using English as well as Indian languages script and retrieves specific pages/sections together with the entire collection.

7.2. Non-awareness of Search options

Users prefer searching to browsing. The items in the database should be searchable by single keyword from the title, author, and abstract etc. The subject should be browsable by title, author, date etc. Search options in some ETDs are limited. Customization on the user interface should be done to certain extent to attract the users. User studies should be conducted in ETD initiatives. The search results and the relevancy of the result can be increased by facilitating more searchable fields within ETDs.

7.3. Aversion to Policies

We should have a commonly accepted policy by both the scholars and universities, regarding the content and management of ETDs, copyright issues, access rights, long-term availability etc. to streamline the problems. All institutions should follow a common framework to develop an ETD repository. The ETD initiatives have been started in India in late nineties. First ETD repository was created in Kerala Agricultural University in 1998 as part of the KAULIS project. At that time there was no Digital Library software like Greenstone or DSpace available in India. Even the term Digital Library was not coined or normally used. University prepared a database of its dissertations in MS Access. The record contained bibliographic fields as per Common Communication Format (CCF). Dissertations were digitized and prepared as electronic books using pdf format. Chapter, subheadings, photographs, illustrations, tables etc. were all bookmarked. The search mechanism took the user to the concerned page where the information searched for occurred. Even though database of about 3000 dissertations were prepared only about 500 theses were digitized and linked to the database.²⁶

7.4. Limited understanding of using metadata schemes

Study revealed that library professionals have a limited understanding on metadata schemes as well as to maintain the standard of the ETD created. OAI has developed a protocol for exchanging metadata. Using the OAI's protocol for Metadata Harvesting (OAI-PMH), individual sites can make their

metadata accessible to providers or discovery services, while maintaining complete control over own resources.²⁷

7.5. Lack of expertise of professionals regarding ICT components

Library professionals in general lack required expertise in ICT components associated with ETD on the aspects of its management and maintenance. Expertise in content enrichment such as adding multimedia resources, animations, interactive pages etc

are also to be improved among professionals. Professionals are to equip themselves to apply ICT applications to make the ETD simple and attractive and professionals are to be trained accordingly. Training is a major requirement for the success of ETD and other OAI. Its importance and need in ETD initiatives have been examined in detail in the study.

8. SUMMARY

Summary of the responses are given in the following tables :-

Vote on awareness of KM (%)	Vote on awareness of ETD (%)	Support rendered by professionals on KM (%)	Support rendered by professionals on ETD (%)	Vote on application & Relevance of KM in LIS (%)	Vote on implementation of KM in LIS (%)	Vote on requirement of Training / Workshop on ETD (%)	Vote on requirement of Training / Workshop on KM (%)
100	100	96	100	91	96	43	43

Table 3 : Summary of responses on KM and ETD

From of Documents accepted			Source of ETD implementation			Software used for ETD			
Born Digital Doc (%)	Scanning of print (%)	Both (%)	Own (%)	Out Source (%)	Other (%)	OS (%)	Commer- cial (%)	In House (%)	Other (%)
73	0	27	64	7	29	65	4	0	31

Table 4 : Summary on aspects of ETD Implementation

Access Policy				Permission to share ETD	Provision for Usage statistics
Global	Intranet	Off Campus	Other		
09	56	13	22	26	52

Table 5 : Summary on Access of ETD

9. ETD AS A TOOL OF KM

KM is highly topical in business and related fields. KM is topical in the LIS profession also as the library users of the modern age have higher expectations about library services. Though there are ambiguity as to its nature and theoretical basis, KM emerging from similar changes has influenced the library and information profession. The LIS literature has a lot of general material on the role of LIS in KM. However, coverage on the practical implementation of KM in LIS environment is only a few. Therefore more discussions, trainings, workshops, symposium, studies and literature are to be initiated and professionals are to be inducted in KM activities. These are the kinds of marketing tools to spread the concept of KM.

The ultimate purpose of KM is to increase the effectiveness and sustainability of organizations. KM in libraries does the same. IFLA International Federation of Library Associations and Institutions has given formal status to KM as the 47th section of its activities to support implementation of KM culture in libraries and information environment. It acknowledges the importance of KM in libraries. However, KM initiatives in libraries have a long way to go and have tremendous potential for improvement.²⁸ This can be

achieved only when the professionals are actively involved in KM activities. Knowledge environments provide unique opportunity for information professionals to become core part of their organization. Creation and maintenance of ETD in the universities and institutions are a step towards involvement of library professionals in KM activities. As Knowledge environments are clearly information centered, the role of library and information professionals in KM activities shall be demanding in a Knowledge Society.²⁹

ICT has an important role for the success of KM. The portal has become the most powerful tool for the delivery of customized data to the end-user. It is one of the "tool for adding value and it offers a single point of entry through a common interface with information, resources and business processes".³⁰ Portal is the place where information exchange and knowledge transfer takes place when interfaced with Repositories, ETDs etc.

KM has emerged as a label for consciously perceiving and addressing the issues raised by the importance and the availability of knowledge. Therefore, Digital Libraries, Digital Archives, Repositories and ETDs are essential for successful KM.

10. CONCLUSION

In India, first and foremost, ETD initiatives suffer from lack of interest with the authorities concerned. Many projects were initiated and sustained by innovative professionals with much suffering and these systems get degraded or discontinued with their leaving the institution. Government of India should conduct a detailed evaluation of the situations that led to the disregarding or discontinuation of the innovative ETD projects initiated at Mysore University (Vidyanidhi) and MG University. The project at MG University was the first to successfully use a package developed in India which was internationally recognized. The repository is still online as on the date on which its updation was stopped probably somewhere in March 2011. Before Government of India or other universities start developing new repositories, they should seriously evaluate these projects and should absorb the experiences of those who lead these projects. No future project should be inferior to these two or should there be a reinvention of technology. The public funds continuously gets used in repetitive projects like technology development and results are not the motive behind projects but only attracting and spending funds.

Lack of quality of the research work may be another reason for not implementing ETDs so as to avoid scrutiny of the research work by the world community. Inhibitions on OAI by the Regulatory/Controlling/Financing authorities such UGC, Ministry of HRD etc prevent implementation of ETDs in India. In order to establish a firm ground for creation of ETDs in India by removing impediments and barriers, a mission mode project may be launched by Ministry of HRD, GOI. If

constitutional provisions (Education is a state subject) are highlighted as an impediment for creation of ETDs, Central Government should streamline the challenges discussed above and launch projects in Central Universities for better implementation. States Universities shall follow the suite in future. If retrospective conversion is projected as a major hurdle, let the universities fix a cut off year for promulgation of Dissertations compulsorily in ETDs. Retrospective conversion can run parallel to th implementation of ETDs. There are remedies by technology, communication, software, hardware etc. However, will is not there. Lack of political will and absence of scientific governance reigns Indian universities.

From the viewpoint of library and information profession, library professionals need to be engaged with emerging technologies on ETD. That shall enable them to improve in technical expertise, search strategies, submission process, digitization process and presevation technologies. It is for the librarianship and information profession to add value to a knowledge-based environment. It also needs to develop interpersonal and business skills in their profession and value itself as a core part of KM systems.

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4. Each article must be accompanied with at most eight key words just after the abstract.
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