

ETD Policies, Strategies and Initiatives in India: A Critical Appraisal

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Abstract

The fruits of research from the formal research programmes of conventional universities and academic research institutions in India were under-utilized as the access to theses, dissertations and research reports were very limited to the next generation researchers and scholars. Modern information and communication technology (ICT) acts as an effective intervener for paradigm shifting from closed access theses and dissertations to open access electronic theses and dissertations (ETD). Now, the researchers in national institutions and universities in India have greater access to research literature, due to subscription to many e-journals and scholarly databases in most subject areas. But, the access to thesis and dissertation literature is very limited due to lack of national databases of theses and dissertations, both in bibliographic and full-text formats. Recently, India's University Grants Commission enacted "UGC (Submission of Metadata and Full-text of Doctoral Theses in Electronic Format) Regulations, 2005" to strengthen national capability of producing electronic theses and dissertations, and, to maintain university-level and national level databases of theses and dissertations. Some elite research institutions, such as Indian Institute of Science, have already started providing access to ETDs through open access archives. Some other institutions have taken initiatives to provide access to ETDs only through intranet (within the campus). The Vidyanidhi, INDEST Consortium, CSIR and INFLIBNET Centre are working towards implementation of open access ETD and/or bibliographic databases of theses and dissertations, but they also have some limitations. National policies on open access to ETD and other research literature, particularly the public funded ones, are yet to be ready. In India, some advocacy and pressure groups also exist that support open access to scholarly literature. Present paper explores the policy frameworks, strategic dimensions and analyses SWOT (strengths, weaknesses, opportunities and threats) of existing ETD initiatives in India.

Introduction

India is a major South Asian country, where an array of specialized research institutions, research centres and universities situated in almost all major subject areas. A country worldwide reputed for its IT industries, India is now hosting corporate R&D centres of some major multinational enterprises owing to its global reputation for academic and research excellence. The accreditation and granting agencies for Indian institutions envisaged this phenomenon growth in knowledge-based industries and service industries in India. Thus, these agencies created a structured higher education and research environment in the country in phases at par with global standard. Over the last few decades the Government strengthened ICT and research infrastructure in reputed Indian institutions across the country, where access to knowledge resources and laboratory facilities is adequate to students, researchers and faculty members. The government research agencies introduced research fellowship schemes for pursuing research degrees to attract meritorious talented students into research and teaching professions and for reversing the brain-drain in developed countries. The establishment of open access digital archives of scholarly literature, produced in Indian universities and institutions, is also a kind of ICT intervention that is

envisaged to portray India's intellectual capabilities and to ascertain quality of research [1]. Electronic theses and dissertations (ETD) initiatives and ETD policies in India lie with India's international reputation and to streamline into systematized focused research to generate more social goods and applications.

Research Fellowship Schemes

The Government of India, through its apex bodies in higher education and research, facilitates research fellowships to support students with an aptitude for research. The national agencies such as, University Grants Commission (UGC), Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR), Indian Council of Agricultural Research (ICAR), Department of Biotechnology (DBT) and other national agencies conduct national level eligibility tests for the award of junior research fellowships to ensure minimum standards for entrants in the academic research. The UGC conducts National Eligibility Test (NET) in the areas of humanities, social sciences and applied sciences, whereas CSIR conducts test in the areas basic sciences [6]. The ICMR, ICAR, DBT also conduct NET in their respective subject areas. The qualified meritorious candidates of NET then become eligible to enroll their names in doctoral research programmes in different universities and institutions across the country. Some research fellows then attach with national laboratories and R&D institutions. The research fellowship is usually available for the first five years of doctoral research, first two years as a junior research fellow (JRF) and next three years as a senior research fellow (SRF). In the 11th national 5 Year Plan period, which just started in April 2007 and will continue till March 2012, Government of India focuses to attract more candidates to junior and senior research fellowships, through flexibility in manpower deployment and enhancement of research fellowship amount. The research fellows are allowed to take part in research projects, consultancy projects and teaching assistantship along side their academic research work and discourse. Presently CSIR inducts about 1200 fresh junior research fellows annually that cumulated to about 7600 research fellows at any point in time, including research fellows employed in CSIR-supported research projects [4]. Similarly, UGC, ICMR, DBT, Department of Science & Technology (DST), Indian Council for Social Science Research (ICSSR) and other national agencies together support almost similar number of research fellows in Indian universities and R&D institutions. Table 1 depicts the proposed schemes to support research fellowships in Indian universities and institutions for the 11th 5-year plan period [4,5]. The responsible agencies also ensure social inclusion and equal opportunities to weaker and backward sections of the society in the research fellowship schemes, including women and physically challenged. All these schemes are meant to increase national scholarship and knowledge generation capacity for emerging as a self-reliant knowledge-based nation. These fellowship schemes facilitates in producing a sizable number of qualitative knowledge resources, in the forms of doctoral theses, patents, research papers and research reports. As these knowledge resources are emanated from public-funded research, Indian open access crusaders and advocacy groups strongly recommend disseminating the fruits of research through open access channels. These groups have already succeeded to sensitize government and other stakeholders. Hence, we see a number of open access initiatives, in the forms of ETD repositories, institutional repositories, metadata harvesting services and open access scholarly journals.

Table 1: Research Fellowship Schemes available during 11th Five Year Plan

Name of the Scheme	Responsible Agency	Amount in Indian Rupees (Crore)	US Dollar (Million)
Research Fellowships in Basic Sciences & Interdisciplinary areas	CSIR	870.00	213.14
GATE qualified Junior Research Fellowship (JRF-GATE) Scheme	CSIR	50.00	12.25
Trans-disciplinary Fellowship Scheme	CSIR	14.00	3.43
Shyama Prasad Mukherjee Fellowship Scheme (SPMF)	CSIR	16.00	3.92
Research Fellowships in all Major Subjects & Interdisciplinary Areas	UGC	1500.00	367.49
Teaching Assistantship for Doctoral Students (Non Fellowship)	UGC	150.00	36.75

Policy Frameworks in India

UGC (Submission of Metadata and Full-text of Doctoral Theses in Electronic Format) Regulations, 2005

In 2005, the University Grants Commission of India (UGC) drafted a national policy framework entitled “UGC (Submission of Metadata and Full-text of Doctoral Theses in Electronic Format) Regulations, 2005” [7]. This Regulation proposed two sets of planned actions, such as:

- **Creation of Indian National Theses Database (INTED):** Proposed Indian National Theses Database (INTED) is an online centralized bibliographic database, where online submission of metadata sets of a PhD thesis is made mandatory when the researcher finally submits his/her PhD thesis to the Research Cell of a university. The PhD supervisor verifies and validates the metadata of submitting PhD thesis. The INTED will be freely accessible worldwide and will have simple and advanced search interfaces. Hence, bibliographic control of all recent PhD theses is assured. Although this online database will be accessible free of charge, its CD-ROM version will be made available at a price.
- **Submission of PhD Theses in Electronic Form:** The researcher will submit his/her PhD thesis in an appropriate electronic format, along side hard copies of his/ her thesis. The UGC Regulations also suggest a specific content structure of electronic thesis, which is derived from the best practices of international ETD sites. The submitted electronic copy of the doctoral thesis will be stored in the respected University’s ETD repository or institutional repository. The ETD repository or institutional repository should be OAI-PMH compliant, so that metadata harvesting services can collect metadata of each submitted/ awarded doctoral thesis. The administrator of the ETD repository will also check the quality of metadata information.

The university will set up committees to formulate copyright and IPR policies, access policy, plagiarism monitoring policy, and other norms related to ETD repository. The access to ETD database can be allowed any of the following: worldwide open access, campus-only access, temporary restricted access, and mixed access (partially open). The ETD may contain textual data along with images, audio objects, video objects, animation objects, spatial objects and other kind of multimedia objects. The ETD can be navigated non-linearly. Thus, hard copy of a thesis document has less number of functionalities than electronic copy of a thesis. The proposed ETD repositories in universities will be developed using latest versions of IR software and will adopt latest versions of metadata schema to handle the advanced features of ETD.

Implications of UGC Regulations

This set of regulations is still under consideration and stakeholders' consultation or might have been shelved due to unknown reasons. This set of Regulations formulates a roadmap in achieving wide dissemination of results of doctoral research conducted in Indian universities and bibliographic control of theses and dissertations of research degrees. So far, a few UGC-supported universities have established open access repositories for scholarly literature produced in the respective universities. Earlier universities were reluctant to change their status quo, as the contents of scholarly literature including the PhD theses will be a matter of critical analysis by the national and international peers, if the universities establish open access repositories. Now, universities will be motivated to produce qualitative doctoral theses and will maintain certain international standards. The UGC also supports development of infostructure in Indian universities through various planned schemes. The proposed national education grid will also enrich modern ICT infrastructure in Indian universities. The Indian universities then have necessary infrastructure to host a number of web-based information services. The hosting an ETD repository and providing online interface to INTED will not be a problem in most of the universities. Now, Indian universities should take proactive role in implementation of these set of regulations at the earliest, ensure qualitative research and make the results of doctoral research widely available. The UGC should also clear all bottlenecks to implement INTED and decentralized ETD repositories across the country. This way the National Knowledge Commission's recommendation on peer-reviewed research papers resulting from publicly funded research would be validated by making them available through open access channels [3].

INDEST Consortium – An Open Access Advocacy Group

The Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium is an innovative initiative supported by the Ministry of Human Resource Development (MHRD) and All India Council for Technical Education (AICTE). Indian Institute of Technology Delhi (IITD) is the coordinating agency for this consortium. The INDEST Consortium tries to address the problems of information poverty in the country and its technical institutions through highly discounted rates of subscription and better terms of agreement with the publishers of electronic resources, such as, full-text e-journals and scholarly databases. The consortium maintains three tiers of membership where total membership strength is now 614. Types of members are shown below:

- Core Members (supported by MHRD) (37)
 - Indian Institute of Science (IISc)
 - Indian Institutes of Technology (IITs) (8)
 - Indian Institutes of Management (IIMs) (6)

- National Institutes of Technology (NITs) (17)
- Indian School of Mines
- North Eastern Regional Institute of Science & Technology
- SHS Longowal Central Institute of Engineering and Technology
- ABV Indian Institute of Information Technology and Management
- AICTE-supported Members (government institutions) (60)
- Self-supported Institutions (private institutions recognized by AICTE) (517)

The core member institutions of INDEST Consortium are globally reputed for their academic and research excellence. These institutions have ICT infrastructure and access to e-resources at par the best institutions of the world. Some of the institutions have already established open access repositories to make their research literature available globally. INDEST Consortium holds annual meetings to discuss on the policies and operational issues. In its 2003 Annual Meeting, INDEST core members proposed to establish an INDEST Digital Theses Archive, where Indian Institutes of Technology and Indian Institute of Science will be major stakeholders. The proposed Digital Theses Archive will have following characteristics [2,8]:

- Joint Initiative between the member institutions, who constitute INDEST
- Full-text database of the masters and doctoral theses from IITs and IISc
- Distributed National and Regional Archives
- Facilitate submission of theses and dissertations electronically by the researchers/ students
- Retro-conversion of existing theses to digital form
- The quality of an academic institution is reflected by the quality of its students' theses and dissertations.

The INDEST will have following roles and tasks as the central coordination agency for national ETD initiative [2,8]:

- coordinating and cooperating with member institutions for organizational, technological and educational issues and developments;
- fundraising, supporting and conceptualizing of decentralized ETD structure, special interest groups and working groups in which representatives from institutions can participate;
- organizing workshops for participating member institutions covering general special topics on ETD formats and archiving methods; and
- liaison with other Indian initiatives like 'Vidyanidhi' and international initiatives like NDLTD.

Text Box 1: Recommendations of INDEST Working Group on 'ETD and EPrint Archives'

ETD and EPrint Archives

1. All IITs and IISc should implement electronic submission of theses and dissertations in addition to their current practice of submissions in theses and dissertations in print;
2. Following the model set-up by the IISc Bangalore, all IITs may set-up e-print archives using OAI-complaint e-print software. While pre-prints and re-prints may be submitted at e-print servers set-up at various IITs / IISc, a central server may be deployed to harvest the metadata from all such e-print archives. The use of OAI-complaint e-print software would facilitate such an environment. It was strongly felt that if the pre-print / re-print submission is followed strictly at all IITs / IISc, the unified collection developed in the process at IITs and IISc (as well as at other such repositories) would offer a strong alternative to existing model of scholarly publishing;
3. All INDEST Consortium members (i.e. IITs and IISc) should follow common protocols and procedures to ensure interoperability of digital collections built-up in the process of e-submissions of theses, dissertations and preprints. The IITs and IISc may adopt OAI-complaint software available in public domain, such as e-prints archive, D-space or the Virginia Tech. ETD, to ensure interoperability;
4. The ETD may be planned as distributed archives with individual institutions holding their theses and dissertations on their own servers while the metadata may be harvested either online or offline on a single

server;

5. IIT Bombay and IIT Kanpur, the two institutions who have already implemented ETD at their respective institutions, may provide trial access to their ETDs to other IITs / IISc;

6. A core development group may be formed to give the technical specifications for the ETD as well as for preprints and for the development of the archive site. This group will also prepare a template for the ETD and preprint site, which can be used by any of the INDEST members to host their ETD archive. The Group may also finalize standards for the metadata needed for the ETD.

Source: Minutes of the Meeting held on 7th October, 2003 at IIT Delhi

<http://paniit.iitd.ac.in/indest/extended/minutes7thoct.pdf>

Implications of INDEST Recommendations

Text Box 1 shows the details of recommendations of INDEST Working Group on ‘ETD and EPrint Archives’. Some core member institutions have already established open access institutional repositories and ETD repositories in their respective institutions. Some core member institutions, such as, IISc, IITs, have started digitization of their back volumes of thesis and dissertation collections on project basis and make them available through open access or campus-wide institutional/ETD repositories. ETD@IISc is considered as a role model of open access ETD repository in the INDEST family. The INDEST Consortium in association with IISc prepared a number of guidelines on the ETD and organized training workshops for implementations of open access repositories in member institutions. This Consortium also provides consultative supports to other Indian consortiums, research agencies and individual institutions in formulation of open access policies and implementation of ETD/institutional repositories.

Doctoral Theses Repository in NASSDOC

The National Social Science Documentation Centre (NASSDOC) (http://www.icssr.org/doc_main.htm) is a constituent of Indian Council of Social Science Research (ICSSR) and a national repository of doctoral theses in the areas of social sciences. NASSDOC is also a partner organization of Vidyanidhi. As a national library of social sciences, NASSDOC aims to build a truly representative collection of doctoral theses and dissertations in all areas of social sciences, including interdisciplinary areas. NASSDOC systematically collects qualitative doctoral theses in the areas of social sciences submitted in Indian universities through an incentive scheme called ‘Acquisition of Thesis’. So far NASSDOC has acquired about 5000 doctoral theses in different areas of social sciences in its special collection. For consideration in this acquisition scheme, the researcher sends the details of his/her research work, i.e. synopsis containing scope, methodology, objectives and major findings. A screening committee examines details of the thesis and recommends decision on acquisition. Doctoral theses on India by any Indian or foreign students approved by the foreign universities are also acquired through this scheme. NASSDOC has planned to digitize and microfilm its theses collection to address space problem and to devise a modern retrieval mechanism of social sciences information. The integration of its digitize ETD collection into Vidyanidhi is a right direction to diffuse Indian social science research findings to worldwide audience. But one thing NASSDOC should keep in mind that Vidyanidhi may be a platform to start with, but NASSDOC should establish an alternative dedicated server for long-term preservation and access.

Recommendations of National Knowledge Commission

The National Knowledge Commission of India (NKC), constituted on 13th June 2005, is a high-level advisory body to the Prime Minister of India, with a mandate to guide policy and direct reforms. NKC's overarching aim is to transform India into a vibrant knowledge-based society. In its first annual report entitled 'Report to the Nation 2006', NKC published its first set of recommendations to the PM of India [3]. If implemented, these recommendations will have far-reaching implications in the knowledge creation and dissemination cycle. NKC strongly advocates open access to public-funded research literature [3]. The theses and dissertations produced by state-sponsored researchers would then be made accessible through open access channels, such as, ETD repositories or institutional repositories. NKC also recommends expansion of Indian higher education system through establishment of new universities, including 50 national universities, totaling about 1500 universities across the country, which is about 3 times addition to existing system. This expansion would enable India to attain a gross enrolment ratio of higher education at least 15 per cent by 2015. This kind of phenomenon expansion requires a huge pool of qualified teaching and research staff, equipped with research degrees, to maintain a minimum standard of teaching and research. Similarly, present university system should also take proper measures to attract meritorious research students for future requirements and disseminate their research papers, theses and dissertations by establishing ETD/institutional repositories.

ETD Initiatives in India

Open Access Initiatives

India is spearheading open access movement in the developing countries since last decade by establishing a number of open access repositories, embracing free and open source software (FOSS). The Indian information professionals experiment with the open source software for establishing institutional repository (IR) in a local library, such as Greenstone, DSpace and EPrints. If an IR is successfully implemented in the local library setup, it then scales up to the institution-wide application through campus-wide network or intranet. Likely, it turns open to the wider audience with the implementation of open access institutional repository, when the authority of institution is convinced. With the availability of the dedicated information infrastructure combined with 24X7 broadband connectivity and national educational grid, some national institutions and universities implemented institutional repositories for wide dissemination of scholarly literature emanated from the respective institutions. Some institutional repositories in India are specially established to diffuse intellectual outputs of the country in the form of electronic theses. Vidyanidhi and ETD@IISc are examples of such kind. Other institutional repositories provide all kind of scholarly materials such as research papers, conference papers, presentations, photographs, along with e-theses. The OpenMED and Librarians' Digital Library are examples of such kind. Table 2 indicates that Vidyanidhi stores maximum number of full-text e-theses followed by DSpace@TIET, ETD@IISc and DSpace@NCL. Some of the institutional repositories are listed in OpenDOAR, OAISTER, CASSIR and other directories/harvesters of open access repositories.

Table 2: Open Access Repositories containing ETD

Name or the Repository	Name of Institution	No. of Full-text Theses	No. of Other Items	URL	Software Used
Vidyanidhi	Univ. of Mysore	4151	0	http://dspace.vidyanidhi.org.in:8080/dspace/	DSpace
Dspace@TIET	Thapar University	259	33	http://dspace.tiet.ac.in/dspace/	DSpace
ETD@IISc	Indian Institute of Science	229	0	http://etd.ncsi.iisc.ernet.in/	DSpace
DSpace@NCL	National Chemical Laboratory	208	149	http://dspace.ncl.res.in/dspace/	DSpace
Open Access Repository of IAP	Indian Institute of Astrophysics	83	1389	http://prints.iiap.res.in/	DSpace
Eprints & ETD@IIT Delhi	Indian Institute of Technology Delhi	30	2106	http://eprint.iitd.ac.in/dspace/	DSpace
DSpace@NITR	National Institute of Technology Rourkela	13	388	http://dspace.nitrkl.ac.in/dspace/	DSpace
OpenMED@NIC	National Informatics Centre	8	1491	http://openmed.nic.in	EPrints
Librarians' Digital Library	Documentation Research and Training Centre	3	364	https://drtc.isibang.ac.in/	DSpace
IIMK's Scholarship Repository	Indian Institute of Management Kozhikode	2	256	http://dspace.iimk.ac.in/	DSpace
RRI Digital Repository	Raman Research Institute	1	2191	http://dspace.rri.res.in/dspace/	DSpace
Numerical Data as on May 15, 2007					

Vidyanidhi

Vidyanidhi is a national ETD repository, initiated by University of Mysore supported by Department of Scientific and Industrial Research of India (DSIR) and Ford Foundation. This is a national level repository, covering a number of universities and deemed universities. Vidyanidhi established official partnership with Jadavpur University, University of Hyderabad, University of Kashmir, Jamia Millia Islamia and National Social Science Documentation Centre (NASSDOC). Table 3 shows the distribution of theses collection by partner universities. Other universities of India also have taken part in this initiative. Vidyanidhi maintains mainly two kinds of databases, a bibliographic database and a full-text repository using DSpace software. Its bibliographic database has interfaces for simple search, advanced search, field-specific search, subject search supervisor search, and author search in English, Hindi and Kannada languages. The search results displays following metadata: Title, Creator (Author), Subject, Contributor (Supervisor),

Language, Degree Grantor and Year. Vidyanidhi aims at enhancing visibility of Indian doctoral research through archiving and disseminating doctoral dissertations of researchers submitted in Indian universities to a global audience. Although, Vidyanidhi has digitization facilities and infrastructure, some of its partner universities don't have such digitization facilities. Thus, the collection of Vidyanidhi grows only when it shares its physical facilities to the other universities, which is not practically feasible in a vast country like India. Till date, most of the universities in India do not insist researchers to submit doctoral theses with electronic copies, either on CD-ROM or online. If electronic copies of doctoral theses are available to the partner universities, they may immediately upload the same to the Vidyanidhi ETD database.

Vidyanidhi is listed in and harvested by online directories and metadata harvesters, such as, Google Scholar, OAISTER, OpenDOAR, and CASSIR.

Table 3: Distribution of Theses Collection by Partner Universities of Vidyanidhi

Name of Partner Institution	No. of Full-text Theses
University of Mysore	1657
University of Hyderabad	394
Jamia Millia Islamia	24
Jadavpur University	3
University of Kashmir	3
Others	2070
Total	4151

Source: <http://210.212.200.226/asp/ourpartners/ourpartners.aspx>

Limitations of Vidyanidhi

Vidyanidhi was established as a project of University of Mysore. Vidyanidhi may fail to sustain for a long time due to following unforeseen reasons: (i) funds of supporting organizations may dry up over time, (ii) the principal project manager or host university may lose interest on the long-term maintenance of such service, however this service will leverage its global visibility.

ETD@IISc

The ETD@IISc is an institutionally acclaimed open access ETD repository of Indian Institute of Science and a joint service of National Centre for Science Information (NCSI) and IISc Library. This repository disseminates and preserves high quality research theses of Indian Institute of Science. This service is a complement to ePrints@IISc, the research publications repository of IISc. Apart from electronic copies of recently submitted theses, this repository also includes digitized theses, where digitization of old documents is an on-going project at IISc. Indian Institute of Science established an 'IISc INDEST User Group' that has subgroups on 'Thesis Format Guidelines', 'Copyright Issues' and 'Technology Issues for Archival and Online Hosting'. ETD@IISc hosts some operational guidelines and agreement forms, derived from the recommendations of the User Group, for the perusal of IISc researchers and members of INDEST Consortium. Over the time this ETD initiative becomes a role model amongst the members of INDEST Consortium. The INDEST Consortium has a strong advocacy role in formulation of policy for establishment of open access ETD repositories and/or open access institutional repositories in its respective member institutions.

The record display page of individual thesis provides links to full-text objects, along with metadata, such as, Title, Author, Subject, Keywords, Date of Submission, Publisher, Abstract, URI, and Appears in Collections. Table 4 shows the distribution of electronic theses in the repository.

Table 4: Distribution of Electronic Theses at ETD@IISc

Name of Division	Number of e-Theses
Division of Biological Sciences	40
Division of Chemical Sciences	25
Division of Electrical Sciences	62
Division of Information Sciences	12
Division of Mechanical Sciences	77
Division of Physical and Mathematical Sciences	13
Total	229

Cross Archive Search Service for Indian Repositories (CASSIR)

The CASSIR (<http://ardb4.ncsi.iisc.ernet.in/oai/>) is a metadata harvesting service for Indian repositories, a project initiated by National Centre for Science Information (NCSI) of Indian Institute of Science (IISc) and supported by Department of Scientific & Industrial Research of India (DSIR). This web-based search and browse service is a part of the ongoing project entitled 'Development of OAI-Based Institutional Research Repository Services in India'. In this service, an OAI-PMH compliant software (PKP Harvester) harvests metadata from the registered open access repositories in India. At present, CASSIR covers Indian open access repositories:

- Catalysis Database (ePrints@NCCR IIT Madras)
- DRS at National Institute of Oceanography
- DSpace at ICFAI BUSINESS SCHOOL (IBS), Ahmedabad
- DSpace at IIMK
- DSpace at National Chemical Laboratory, Pune
- DSpace at Vidyanidhi
- DSpace@DRTC
- Dspace@NITR
- DU Eprint Archive
- ePrints@IISC
- ePrints@IIT Delhi
- ETD at Indian Institute of Science
- DSpace@Indian Institute of Astrophysics
- DSpace@ISI Bangalore
- NAL Institutional Repository
- OneWorld South Asia Open Archive Initiative
- OpenMED@NIC
- RRI Digital Repository

These open access repositories store a number of ETDs. Thus, CASSIR serves a functionality of cross-searching of repositories. This cross-searching functionality is much needed in a country like India where hundreds of open access repositories are expected to be proliferated in near future, if the *UGC (Submission of Metadata and Full-text of Doctoral Theses in Electronic Format) Regulations* implemented soon. Figure 1 shows the search interface of CASSIR, where

searching of ETDs in Indian repositories can be carried out easily, by limiting document type as 'thesis'.

The screenshot shows the CASSIR advanced search interface. At the top, there is a navigation menu with 'Home', 'About', 'Search', 'Browse', and 'Help'. Below this, the page title 'CASSIR' is displayed, followed by the subtitle 'Cross Archive Search Services for Indian Repositories'. The main search area is divided into several sections. On the left, there is a list of 'All Fields' including Archives, Title, Creator, Date, Language, Identifier, Description, Format, Publisher, Rights, Type, Subject, Relation, and Contributor. The 'Archives' field is currently selected, and a dropdown menu is open, showing a list of repositories: 'All Archives', 'Catalysis Database (ePrints@NCCR IIT Madras)', 'DRS at National Institute of Oceanography', 'DSpace at ICFAT BUSINESS SCHOOL (IBS), Ahmedabad', and 'DSpace at IIMK'. The 'Date' section has 'From' and 'Until' dropdowns for months. The 'Language' dropdown is set to '(None)'. A 'Search' button is located at the bottom left of the search area. On the right side, there is a 'Content' sidebar with a search box and font size controls.

Figure 1: Advanced Search Interface of CASSIR

Bibliographic Databases of Theses and Dissertations

CSIR e-Thesis

The CSIR e-Thesis (http://csirexplorations.com/ethesis/e_thesis.htm) is an online bibliographic database of doctoral theses submitted by CSIR research fellows. This is an initiative of CSIR Unit for Research and Development of Information Products (URDIP) at Pune, India. E-Thesis database is an authoritative source for information about doctoral theses and dissertations, submitted in Indian universities by researchers who availed CSIR Junior Research Fellowship (JRF) or Senior Research Fellowship (SRF) scheme. CSIR fellows carry out their research work in over 250 national laboratories, universities and research institutes in India. This database is popularly used by doctoral candidates, faculty members and scientists who would like to know the topics of completed research by past research fellows. At the time of submission of PhD thesis in Indian university, a CSIR research fellow submits electronic copy of his/her thesis on CD-ROM to URDIP along with a descriptive set of metadata for inclusion in this online database. The research fellow also receives a token financial incentive (INR 3000.00, about USD 74.00) to recover cost of creation of CD-ROM. As CSIR is the largest supporter of doctoral research work in the country, URDIP in association with Human Resources Development Group (HRDG) of CSIR is creating a digital library of CSIR supported PhD Thesis in the 11th Plan period (2007-2012) of the country. Probably, the existing CSIR e-Thesis database will be scaled up for this purpose.

CSIR e-Thesis database has different searching and browsing options, such as, browse, simple search, advanced search and thesis bibliography. This database can be searched by parameters using Boolean operators, such as, Title, Author, Guide, Institute, University, Synopsis, and All Fields. The retrieved record of a thesis is displayed with the metadata, such as, e-Thesis Number, Title, Author, Position, Guide, University, Institute, Area, Specialization, Submitted Year, Synopsis, Papers (Links), and Patents (Links). Table 5 shows the coverage of subject areas in this bibliographic database. This Table indicates that largest number of theses belongs to Chemistry, which suggests that CSIR gives much priority to Chemical Sciences and Chemical Engineering than other S&T areas. This Table also suggests that the e-Thesis database probably does not cover comprehensively, but created records only from few CSIR institutions. Figure 2 depicts the Advanced Search Interface of e-Thesis database, whereas Figure 3 depicts the display format of a retrieved record from the database. Table 6 indicates a detailed template and metadata schema for submission of thesis record in the CSIR e-Thesis database. This template is very comprehensive and meticulously followed by the CSIR research scholars at the time of submission of e-thesis on CD-ROM. Link to research papers and patents is a unique option that facilitates navigation of intellectual contributions of researcher in the forms of patents and research papers.

Table 5: Subject Coverage in CSIR e-Thesis Database

Area	Number of Records	Percent
Chemistry	541	82.22
Biology	54	8.21
Physics	40	6.08
Biotechnology	11	1.67
Pharmaceuticals	2	0.30
Engineering	2	0.30
Leather Processing	2	0.30
Botany	1	0.15
Earth Sciences	1	0.15
Environment	1	0.15
Medicine	1	0.15
Others	2	0.30
Total	658	100.00

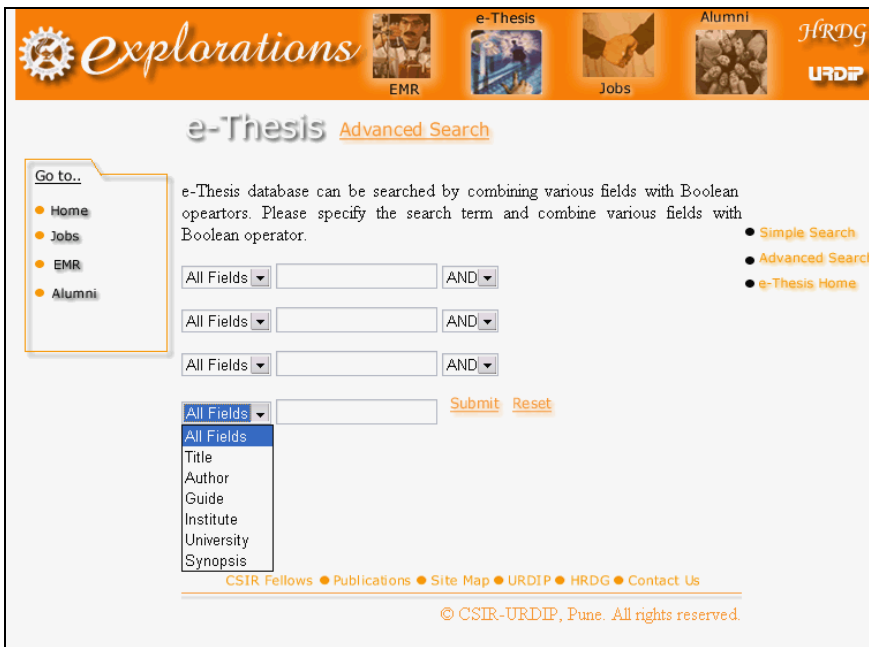


Figure 2: Advanced Search Interface of CSIR e-Thesis Database



Figure 3: Display Page of Thesis Record in CSIR e-Thesis Database

Table 6: Template for Inclusion in CSIR e-Thesis Database

Metadata Schema	Details
Title	Title of the Thesis
Author Details	(a) Name of the research student (b) CSIR number awarded (c) The rank held at CSIR (JRF, SRF, RA, etc) (d) Contact e-mail (e) Qualifications (f) Address for correspondence (g) Permanent address
Guide Details	(a) Name of the guide (b) Contact e-mail (c) Qualifications (d) Address for correspondence (e) Permanent address
Degree	Degree awarded for the thesis
University	Name of the university where the thesis is submitted
Institute/Lab	Name of the CSIR lab / academic institution
Date of Submission	Date of submission of thesis to the university
No. of Pages	Total No. of pages of the document
Subject/Area	Research area (with discipline and specialization)
Abstract/Synopsis	Abstract appears here
Publications	Full bibliographic details of published papers
Patents	Full bibliographic details of patents obtained/applied pertaining to this thesis
Source: Guidelines for Submission of Dissertations in Digital Format http://csirexplorations.com/ethesis/submit_thesis.htm	

INFLIBNET's National Online Union Catalogue of Doctoral Theses

National Online Union Catalogue of Doctoral Theses (<http://202.141.130.73/unicat/thesis.jsp>) is a database of bibliographic records of doctoral theses submitted to more than 130 universities/institutes in India. This is an initiative of Information and Library Network Centre (INFLIBNET) of University Grants Commission (UGC). This database consists of over 1,70,000 unique records from all subject areas, contributed by participating libraries of Indian universities or collected from various reliable sources and university announcements. As this database is created by a specialized centre of UGC, probably this is a predecessor of proposed Indian National Theses Database (INTED).

This online union catalogue has interfaces of basic search and advanced search. The database can be searched by title of thesis, name of researcher, name of guide, name of university, place of publisher, year of award, subject descriptor, and a Boolean combination. The search result generates a display page, containing the metadata of title of thesis, name of creator/researcher, name of university, year of award, subject/keywords, language, along with details of library held this thesis (for inter-library loan request. Figure 4 depicts the basic search interface along with descriptions of metadata schema adopted by this union catalogue. Figure 5 shows how advanced search can be carried out using Boolean operators.

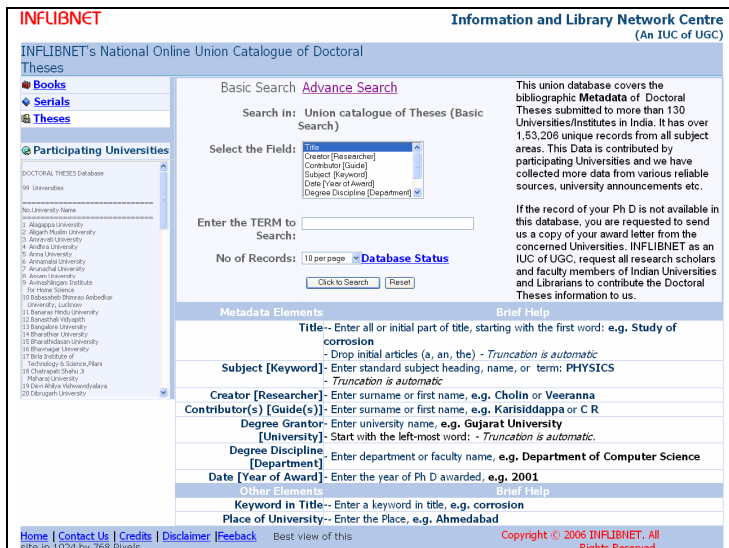


Figure 4: Basic Search Interface of National Online Union Catalogue of Doctoral Theses

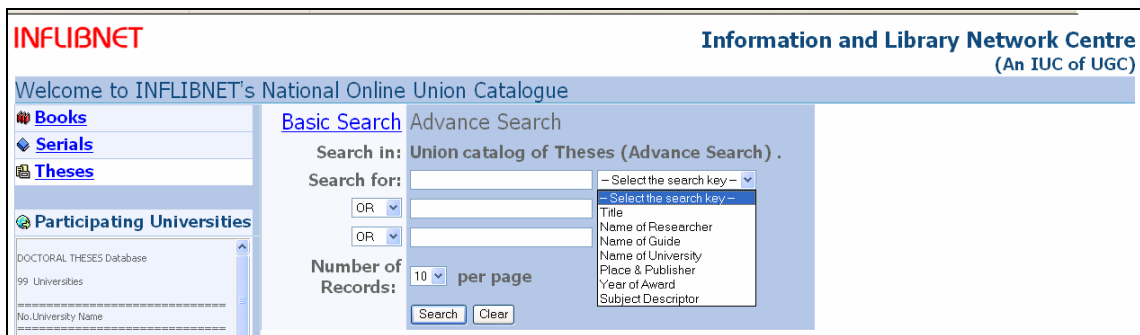


Figure 5: Advanced Search Interface of National Online Union Catalogue of Doctoral Theses

DELNET Theses and Dissertations Database

DELNET Theses and Dissertations Database is an online union catalogue of bibliographic records of theses and dissertations available in member libraries (about 1100) of Developing Library Network (DELNET) (<http://delnet.nic.in>). This union catalogue is a closed access database, accessible to the library users of member institutions only. This database contains about 44,300 records of theses and dissertations. The search interfaces of this database generate a record display page with metadata like, title of thesis, author, subject descriptors, year of submission, location, physical document, type of material, place and publisher, etc. This database contains records of master's and higher level theses and dissertations, including project reports of post-graduate courses. This database is merely a union catalogue, and cannot be considered as an authoritative database of theses and dissertations.

Conclusions

Present study indicates that national ETD initiatives are still in developmental phase where more action plans are needed. The stakeholders are mostly aware of the implications of open access, but they are awaiting for some concrete policy frameworks by the national accredited and granting agencies. National capacity building and self-sufficiency in maintaining electronic theses and dissertations can only be achieved by concerted approaches to this problem from national policy making agencies. The maintenance of quality and standards of research degrees is considered as a major hurdle in expansion of higher education system. Open access to theses literature will bring the research literature under the purview of critical studies by scholarly forums and public review. If the public-funded researches produce futile results, the critical forums can press the funding agencies to adopt a mechanism for quality checks. The open access literature can also emerge as a safeguard mechanism to reduce risks of duplication in research efforts. Hence, open access to scholarly literature in a developing country like India is need of the hours to produce social goods and social applications, rather than merely providing research degrees to the beneficiaries.

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