

## Open access journals and institutional repositories: practical need and present trends in India

Mohammad Nazim<sup>a</sup> and Maya Devi<sup>b</sup>

<sup>a</sup>Central Library, Banaras Hindu University, Varanasi-221005, Email: nazim@sify.com

<sup>b</sup>Department of Library & Information Science, Banaras Hindu University, Varanasi-221005

Trends in open access publishing in India are discussed. Data was collected from directories of open access journals and institutional repositories. The URL of each institutional repository and open access journals publisher was visited to collect relevant data and information including from earlier studies. Case study method was used to know the trends of open access publishing in India. Data is analyzed based on certain parameters, such as number of institutional repositories and open access journals, number of documents, software used, types of documents, etc. Among the top 25 open access publishing countries, India ranks 12<sup>th</sup> for the overall number of journals, but drops to 18<sup>th</sup> for journals with online content. However, its position in the list of open access journals is fifth. At present India ranks 12<sup>th</sup> in the list of countries with registered interoperable archives in the Registry of Open Access Repositories (ROAR).

### Introduction

It has been man's continual quest to be able to identify, locate and have access to all records of knowledge available anywhere and in any language, which might be of interest to him<sup>1</sup>. Dr. S.R. Ranganathan, the father of library science in India, in his famous book *Five Laws of Library Science*<sup>2</sup> indicated the need of availability of documents to every user irrespective of the fact where the user is and where the document is available? The idea put forward by Ranganathan long back was mooted in a transformed and magnified form with the Budapest Open Access Initiative arising from a small meeting convened in Budapest by the Open Society Institute (OSI) on December 1-2, 2001. The purpose of the meeting was to accelerate progress in the international effort to make research literature in all academic fields freely available on the Internet.

### Open access

Access to information which is the foundation of scholarly communication has traditionally been provided through academic journals, research collections, and other print publications. Recent advances in information and communication technologies, especially the Internet and the web revolutionized scholarly communication,

leading to innovations in the conduct of research as well as in the conveyance of ideas to readers<sup>3, 4</sup>. One of the important contributions of web technology has been the creation of open access archives or repositories containing the full text and data of any published research article, available free of charge to anyone, anywhere in the world.

Open access is the subject of much discussion amongst academics, librarians, administrators, government officials and learned society publishers. The first major international statement on open access, which includes a definition, background information and a list of signatories, is the Budapest Open Access Initiative. The other two leading statements are the Bethesda Statement on Open Access Publishing and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. The conception of open access in these three statements, which is often called the BBB (Budapest, Bethesda and Berlin) definition, launched, inspired, and continues to guide the open access movement.

The open access is the worldwide effort to provide free online access to scientific and scholarly research literature, especially peer-reviewed journal articles and their preprints. Essentially it means the provision of free,

immediate (upon publication), permanent access to research results for anyone to use, download, copy and distribute. Moreover, the definition stipulates that articles are placed in an organized repository (rather than simply on author websites) which is interoperable according to a specific set of standards such as the Open Archive Initiative- Protocol for Metadata Harvesting (OAI-PMH). Open access is “cost effective way to disseminate and use information. It is an alternative to the traditional subscription-based publishing model possible by new digital technologies and networked communication”<sup>5</sup>. The goal of the open access movement is to make scholarly articles freely available in digital form world wide with minimal restrictions in their use.

Open access literature is available in open access journals, institutional repositories, subject repositories, digital archives, and so on. Another service that has gained momentum after establishment of different institutional repositories or open access archives is the metadata harvester. Metadata harvester harvests metadata from various open access archives and open access journals.

### Practical need of open access publishing

Open access publishing of scientific literature is of benefit to all scientists, in particular those of the developing nations where academic, medical and non-profit research institutions have limited resources, and libraries often have inadequate funds to subscribe to scientific literature. Open access is also valuable in advancing the public understanding of science. Much of the research conducted in scientific organizations, academic institutions and public sector is publicly funded through taxes and donations, and increasingly the public are interested in free access to the results of this research. The demand for open access publishing is growing fast and has powerful support from the scientific community. Several major research funding bodies, including the Wellcome Trust (UK), the Howard Hughes Medical Institute (USA) and the National Institute of Health (USA) and M S Swaminathan Research Foundation (India) strongly encourage their scientists to publish their research output in open access journals and institutional repositories. Immediate unrestricted access to scientific ideas, methods, results, and conclusions will speed up the progress of science, technology and medicine, and will more directly bring the benefits of research to the public. There are a lot of benefits by which the open access publishing fulfill the needs of end users.

Table 1 – Top 25 publishing countries (scholarly publishing)

Rank	All journals	Online journals	Open access
1	USA	USA	USA
2	UK	UK	UK
3	Germany	Netherlands	Brazil
4	Netherlands	China	Japan
5	China	Germany	India
6	Japan	Australia	Canada
7.	Italy	Canada	Australia
8.	France	Japan	Germany
9	Australia	France	Chile
10	Poland	Switzerland	Venezuela
11	Canada	Russia	Spain
12	India	Italy	France
13	Spain	Spain	Italy
14	Switzerland	Denmark	Pakistan
15	Russia	Brazil	Switzerland
16	Belgium	Sweden	Poland
17	Austria	South Africa	Mexico
18	Sweden	India	Turkey
19	Denmark	Singapore	China
20	Brazil	New Zealand	South Korea
21	South Africa	Norway	Czech Republic
22	Singapore	Austria	Croatia
23	Egypt	Ireland	Netherlands
24	Norway	Mexico	Sweden
25	Czech Republic	Poland	Finland

### Open access publishing in India

India is in forefront of developing world as well as in South Asian region both in terms of economic growth and scientific productivity. Despite a long history of science scholarship and philosophical inquiry dating back to millennia before the emergence of modern European civilization, India is struggling to keep pace with the West in science and technology. Although there are about 300 universities, and about same number of government funded research laboratories under agencies such as Department of Atomic Energy and Space and the Ministries of Defence, Agriculture, Science & Technology and Ocean Development, India's research output in science and technology, as seen from the *Web of Science* is barely 2.5% of the world journal literature<sup>6</sup>. In the scholarly publishing world, India is exceptional by not having a high percentage of its scientific journals available online (Table 1). Among the top 25 publishing countries, India ranks 12<sup>th</sup> for the overall number of journals, but drops to 18<sup>th</sup> for journals with online content<sup>7</sup>. Surprisingly, however, its position in the list of open access journals is fifth, well ahead of countries such as Netherlands, China, Germany, Australia, and so on which are higher in the list of online journals.

Table 2 – Major publishers of open access journals in India

Name of publisher/ host organization	No. of journals	URL	Registration required	Search facility	Subject areas
Indian National Science Academy	8	<a href="http://www.insa.ac.in/">http://www.insa.ac.in/</a>	Yes	Yes	S & T
Indian Academy of Sciences	11	<a href="http://www.ias.ac.in/pubs/journals/">http://www.ias.ac.in/pubs/journals/</a>	No	Yes	S & T
Indian Medlars Centre, National Informatics Centre	38	<a href="http://medind.nic.in/">http://medind.nic.in/</a>	No	Yes	Medicine
Medknow Publications	45	<a href="http://www.medknow.com/journals.asp">http://www.medknow.com/journals.asp</a>	Yes	Yes	Medicine
Indianjournals.com	9	<a href="http://www.indianjournals.com">http://www.indianjournals.com</a>	Yes	Yes	S & T, Medicine
Kamla-Raj Enterprises Sciences,	7	<a href="http://www.krepublishers.com/KRE-New-J/">http://www.krepublishers.com/KRE-New-J/</a>	No	No	Social Sciences & Humanities

Among the non high income countries, India ranks second only to Brazil for the number of open access journals. Almost 50 percent of the online journals from India are open access.

### Open access journals in India

A large number of scholarly journals are published from India in print as well as online form covering wide spectrum of subjects. At present there are more than 150 open access journals in India. The open access journals in India are mainly initiated by six journal publishers, namely, Indian Academy of Sciences, Indian National Science Academy, Indian Medlars Centre of National Informatics Centre, Medknow Publications, indianjournals.com and Kamla-Raj Enterprises. Detail of these publishers is given in Table 2. During the search of these journals some publishers ask user registration and login to access the contents of journals; while others provide facilities from the gateways to search by the name of authors, keywords, etc.

### Institutional repositories/archives

An institutional repository is an on-line locus for collecting and preserving –in digital form- the intellectual output of an institution, particularly a research institution<sup>8</sup>. For a university this would include materials such as research journal articles before (preprint) and after (post prints) undergoing peer review, and digital versions of theses and dissertations, but it might also include other digital assets generated by normal academic life, such as administrative documents, course notes or

Table 3 - Institutional repositories: top 12 countries

Sr. No.	Country	No. of IRs	No. of records	Mean
1	USA	221	3034901	17342
2	UK	104	334359	3757
3	Germany	82	261141	3678
4	Brazil	54	259067	6477
5	Japan	43	411545	11123
6	Canada	41	82146	2282
7	France	39	205885	6055
8	Sweden	34	60487	1833
9	Australia	33	212890	7603
10	Spain	30	204259	8881
11	Italy	28	18620	846
12	India	26	23166	1423

learning object. Main objectives for having an institutional repository are:

- to create global visibility for an institution's scholarly research;
- to collect content in a single location;
- to provide access to institutional research output by self-archiving it;

Table 4 – Institutional repositories/archives in India

Name of IR & host institution	URL	Total records	Types of record	Software used
Bioinformation, BMI Inc.	<a href="http://www.bioinformation.net">http://www.bioinformation.net</a>	—	Research papers, articles, reports, etc.	Other Software
DSpace @ <u>Delhi College of Engineering</u> faculty & student	DSpace	<a href="http://202.141.12.109:8080/dspace">http://202.141.12.109:8080/dspace</a>	publications, thesis, projects, etc.	—
Dspace@ INFLIBNET, Ahmedabad	<a href="http://dspace.inflibnet.ac.in">http://dspace.inflibnet.ac.in</a>	504	Research papers, articles, reports, etc.	
DSpace at <u>ICFAI Business School, Ahmedabad</u> Faculty and research staff articles, cconference papers, cases, etc.		<a href="http://202.131.96.59:8080/dspace/community-list">http://202.131.96.59:8080/dspace/community-list</a>		210
Dspace@Guru Govind Singh Indraprastha University, Delhi	<a href="http://dspace.ipu.ernet.in:8080/dspace/">http://dspace.ipu.ernet.in:8080/dspace/</a>		Theses, faculty, students and university publications, lectures notes, etc.	DSpace
DSpace at University of Hyderabad	<a href="http://202.41.85.207:8080/dspace/index.jsp">http://202.41.85.207:8080/dspace/index.jsp</a>	—	Research papers, articles, reports, etc.	DSpace
Repository of Indian Institute of Astrophysics, Bangalore	<a href="http://prints.iap.res.in/">http://prints.iap.res.in/</a>	1772	Research paper, articles, reports, etc.	DSpace
DU Eprints Archive, University of Delhi	<a href="http://eprints.du.ac.in/">http://eprints.du.ac.in/</a>	168	Pre-prints, conference, patents, etc.	GNU EPrints
EPrints@Indian Institute of Management, Kozhikode	<a href="http://eprints.iimk.ac.in/">http://eprints.iimk.ac.in/</a>	—	Research papers, articles, reports, etc.	GNU EPrints
EPrints@Indian Institute of Technology, Delhi	<a href="http://eprint.iitd.ac.in/dspace/">http://eprint.iitd.ac.in/dspace/</a>	2143	Research papers, articles, reports, etc.	DSpace
ETD@IISc, Indian Institute of Science, Bangalore	<a href="http://etd.ncsi.iisc.ernet.in/">http://etd.ncsi.iisc.ernet.in/</a>	264	Theses & dissertations,	DSpace
EPrints@India Institute of Information Technology, Allahabad	<a href="http://eprints.iiita.ac.in/">http://eprints.iiita.ac.in/</a>	22	research paper, articles, reports, etc.	GNU EPrints
Dspace@Indian Institute of Management, Kozhikode	<a href="http://dspace.iimk.ac.in/">http://dspace.iimk.ac.in/</a>	412	Research paper, articles, reports, etc.	DSpace
EPrints@Indian Institute of Science, Bangalore	<a href="http://eprints.iisc.ernet.in/">http://eprints.iisc.ernet.in/</a>	8617	Theses, conference papers, unpublished, patents, etc.	GNU EPrints
ISI Library, Indian Statistical Institute, Bangalore	<a href="http://library.isibang.ac.in:8080/dspace/">http://library.isibang.ac.in:8080/dspace/</a>	10	Research papers, articles, reports, etc.	DSpace
Librarian's Digital Library, Documentation Research & training Centre, Bangalore	<a href="http://drtc.isibang.ac.in/">http://drtc.isibang.ac.in/</a>	372	Research papers, articles, reports, etc.	DSpace
Medknow EPrints	—	—	Research papers, articles, reports, etc.	GNU EPrints
NAL Institutional Repository, Bangalore	<a href="http://nal-ir.nal.res.in/">http://nal-ir.nal.res.in/</a>	2521	Research papers, articles, reports, etc.	GNU
EPrints@ <i>National Centre for Catalysis Research, Madras</i>	<a href="http://www.eprints.iitm.ac.in">www.eprints.iitm.ac.in</a>	981	Research papers, theses, patents, project reports	GNU EPrints
Eprints@NCL, National Chemical Laboratory, Pune	<a href="http://dspace.ncl.res.in/">http://dspace.ncl.res.in/</a>	407	Theses, research papers, articles, reports, etc.	DSpace
Digital Repository Service of National Institute of Oceanography, Mumbai	<a href="http://drs.nio.org/drs/index.jsp">http://drs.nio.org/drs/index.jsp</a>	640	Conference proceeding articles, technical reports, theses, dissertations, etc.	DSpace

Dspace@ National Institute of Technology, Rourkela	<a href="http://dspace.nitrkl.ac.in/dspace/">http://dspace.nitrkl.ac.in/dspace/</a>	498	Theses, research papers, articles, reports, etc.	DSpace
One World South Asia Open Archive Initiative	<a href="http://open.ekduniya.net/">http://open.ekduniya.net/</a>	88	Conference, theses, unpublished, patents, etc.	GNU EPrints
OpenMED@National Informatics Centre, New Delhi	<a href="http://openmed.nic.in/">http://openmed.nic.in/</a>	1694	Research papers, articles, reports, etc.	GNU EPrints
Rajiv Gandhi Centre for Biotechnology	<a href="http://www.rgcb.res.in/">http://www.rgcb.res.in/</a>	—	Research papers, articles, reports, etc.	Other softwares
Digital Repository of Raman Research Institute, Bangalore	<a href="http://dspace.rii.res.in/">http://dspace.rii.res.in/</a>	3227	Research paper, articles, reports, etc.	DSpace

- to store and preserve other institutional digital assets, including unpublished or otherwise easily lost (“grey”) literature (e.g., theses or technical reports).

There are now adequate easily available softwares to create and maintain an institutional repository. Dspace, GNU Eprints, HAL, OPUS, Bepress, ETD and Greenstone are some important soft wares used to build an institutional repository. The Registry of Open Access Repositories (ROAR) listed 954 institutional repositories in all over the world having more than ten million records<sup>9</sup>. The contents of most of the institutional repositories include demonstration, research cross- institutional, research institutional or departmental, and e-journal/Publication-thesis and databases.

At present India ranks 12<sup>th</sup> in the list of countries with registered interoperable archives in ROAR<sup>10</sup>. Table 3 shows the country wise distribution of institutional repositories and their total records.

### Institutional repositories in India

The Indian Institute of Science was the first in the country to set up an interoperable institutional archive (ePrints@IISc), under the leadership of the late Dr. T.B. Rajshekhar. The archive now has more than 8000 records, with over 70 percent having full text. Presently there are 26 institutional archives in India which are listed in the Registry of Open Access Repositories. Unfortunately out of the 26 Institutional archives only 20 were accessible and functional at the time of writing this paper. It is estimated that currently these institutional repositories are having more than 23166 records<sup>11</sup>. It is also important to note that only one institutional archive had more than 8000 records. The details of institutional repositories in India are shown in Table 4.

### Metadata harvesting services in India

A metadata harvester harvests or indexes metadata from OAI-compliant archives or repositories through harvesting software that support a protocol known as OAI-PMH (Open Access Initiative Protocol for Metadata Harvesting). Some Indian institutions have been experimenting with metadata harvesting services and installed metadata harvesters.

Cross Archives Search Services for Indian Repositories (CASSIR) of Indian Institute of Science (IISc), Bangalore is one such metadata harvesting service. This service is a part of the ongoing project “Development of OAI-Based Institutional Research Repository Services in India”, sponsored by Department of Scientific & Industrial Research, Ministry of Science & Technology, Government of India. This project is being carried out at National Centre for Science Information (NCSI), Indian Institute of Science (IISc), Bangalore. The service harvests metadata as per the OAI-PMH protocol from the registered OA repositories in India. It also provides web-based search/browse functionality over the harvested metadata. CASSIR currently has 16929 records from 18 Indian repositories indexed<sup>12</sup>.

Search Digital Libraries (SDL) of Documentation Training and Research Centre (DRTC) is another such metadata harvesting service, which harvests library and information science subject-specific open access archives and repositories. SDL is a popular service amongst Indian and international library and information professionals. At present it has 19597 papers from 9 archive(s) indexed<sup>13</sup>. Indian Institute of Technology, Delhi has initiated a metadata harvesting service called SEED (Search Engine for Engineering

Table 5 – Metadata harvesting services in India

Name	Host institution	URL	Archives/journals indexed
Cross Archive Search Services for Indian Repositories (CASSIR)	National Centre for Science Information (NCSI), Bangalore	<a href="http://casin.ncsi.iisc.ernet.in/oai/">http://casin.ncsi.iisc.ernet.in/oai/</a>	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@nitrr; DU Eprint Archive; ePrints@iisc; ePrints@IIT Delhi; etd AT Indian Institute of Science; Indian Institute of Astrophysics; ISI Library, Bangalore; NAL Institutional Repository; OneWorld South Asia Open Archive Initiative; OpenMED@NIC RRI Digital Repository.
Search Digital Libraries (SDL)	Documentation Research and Training Center, Bangalore	<a href="http://drtc.isibang.ac.in/sdl/">http://drtc.isibang.ac.in/sdl/</a>	Australian Library and Information Science Association (ALIA); CALTECHLIB; CCSD: Sciences de l'Information et de la Communication, France; CNR Bologna Research Library, Italy; Diálogo Científico utiliza, Brazil; DLIST, University of Arizona; DSPACE inra Avignon; E-LIS: E-Prints in Library and Information Science; LDL; OCLC Research Publications; Subject Gateway of Library and Information Services (LIS); University of North Carolina, USA; WWW Conference Archive EPrint servers.
SJPI Cross Journal Search	National Centre for Science Information (NCSI), Bangalore	<a href="http://144.16.72.144/harvester/">http://144.16.72.144/harvester/</a>	It indexes Bulletin of Materials Science; Current Science; Journal of Astrophysics and Astronomy; Journal of Biosciences; Journal of Chemical Sciences; Journal of Genetics; Journal of the Indian Institute of Science; Pramana - Journal of Physics; Proceedings Earth Planetary Sciences; Proceedings Mathematical Sciences; Resonance; Sadhana; SRELS Journal of Information Management.
SEED	Indian Institute of Technology, New Delhi	<a href="http://eprint.iitd.ac.in/seed/">http://eprint.iitd.ac.in/seed/</a>	Dspace@NITR; Earthquake engineering; Eprints@IISc; Eprints@IIT Delhi.
Open J-Gate	Informatics India Ltd., New Delhi	<a href="http://www.openj-gate.com/">www.openj-gate.com/</a>	Covers 4269 + open access academic, research and industry journals. Out of them 1,500 are peer-reviewed scholarly journals.

Digital-repositories). The Seed currently has 6176 papers from 4 archives indexed<sup>14</sup>.

SJPI Cross Journal Search Service is a recent initiative from NCSI at IISc that harvests metadata from 13 Indian open access repositories. The SJPI harvester currently has 1047 papers from 13 journals indexed<sup>15</sup>. Open J-Gate is an electronic gateway to global journal literature in open access domain. Launched in 2006, Open J-Gate is the contribution of Informatics (India) Ltd to promote

OAI. Open J-Gate provides seamless access to millions of journal articles available online. Open J-gate is also a database of journal literature, indexed from 3000+ open access journals, with links to full text at publisher sites. At present Open J-Gate indexes 4269 open access journals from different subject categories viz. Agricultural and Biological Sciences, Arts & Humanities, Basic Sciences, Biomedical Sciences, Engineering & Technology, Library & Information Sciences and Social & Management Sciences<sup>16</sup>.

### **Current trends and future prospects of open access movement in India**

There has been a good move in India with regard to open access archives setting up, and a lot of efforts dedicated to create awareness about the benefits of open access archives to store and disseminate scientific knowledge to the society. In India, there are a large number of research institutions under ICMR, ICAR, CSIR, and ICSSR which are engaged in research activities. They are interested to disseminate their scientific output in the form of research publications through the open access institutional repositories.

In December 2003, the Indian National Science Academy (INSA) held a one day conference on access to scientific data and information as part of its annual meeting in Pune. The conference, which was held to address two key problems faced by Indian Scientists are, (i) poor access to international journals and the low visibility of papers published by Indian scientists (ii) the possible solution offered by online publishing and open access archives. Workshops on “open access and institutional repositories” have been organized under the aegis of the M.S. Swaminathan Research Foundation, Chennai in May 2004<sup>17</sup>. The primary purpose of the workshops was to provide Indian scientists and librarians with (i) a thorough understanding of the global scientific and scholarly communication issues that open access addresses; (ii) the technical knowledge of how to set up and maintain an open access institutional archive, and (iii) an awareness of the local institutional policy and organizational requirements for a successful, sustainable open access institutional archive. A special session on open access was held at the 93<sup>rd</sup> Indian Congress in January 2006 with the recommendation for the “Optimal National Open Access Policy”. It is interesting to note that the majority of the existing institutional repositories in India have been established by the participants of this workshop. The Digital Library of India (DLI) has already been set up which provide free access to the million books in Indian languages. The University Grants Commission (UGC) has funded a project at Mysore University to set up an archive of doctoral theses available in Indian universities which is known as Vidyandhi.

An open access statement is likely to be ready in the near future. The CSIR also has a plan to setup a national digital repository of research literature. NISCAIR has already started to work on the project known as National Science Digital Library. National knowledge Commission is also formulating similar open access policies and guidelines for the higher education and R & D sectors to improve access to research literature and disseminate research literature to the global communities. The National Knowledge Commission has submitted its report to the Government on how to redefine the information services sector. The report of Knowledge Commission on library sector suggests that “Every state should establish a registry and archives of knowledge based digital resources which should be made accessible to all”<sup>18</sup>.

### **Conclusion**

Importance of open access archives, institutional repositories and open access journals has been realized by the library and information professionals in India. This movement has been accelerated by the availability of open source softwares namely DSpace, EPrints, Greenstone, etc. The research institutions in India are actively involved in the development of institutional repositories. Indian Institute of Science, Bangalore, INFLIBNET Centre, Ahmedabad and Documentation Research and Training Centre (DRTC), Bangalore are the leading institutions that has made this movement a great success. Open access journals and institutional repositories are two important means for delivering open access to research literature. Studies and usage statistics of some repositories show that the researchers of developed nations are accessing the Indian literature available in the open access journals and archives. India is not only leading in open access movement of the developing countries, but also making developed countries aware of qualitative scholarly literature originated from developing countries. Most of efforts are continuing to set up open access archives or institutional repositories. In near future we will see a sustainable growth of open access archives and journals in India.

### **References**

1. Husain S, Universal availability of publications: problems and prospects, *Annals of Library Science and Documentation*, 31 (1-2) (1984) 38 - 43.

2. Ranganathan S R, *Five Laws of Library Science*, (Blunt & Sons Ltd.; London), 1957.
3. Chowdhury G G and Chowdhury S, *Information Sources and Searching on the World Wide Web*, (Library Association, London), 2003.
4. New Models of Publishing. Association of Research Libraries. Available <http://www.arl.org/sc/models/index.shtml> (Last accessed on 14.11.2007).
5. New Paradigms: The Open Access Movement. Association of Research. Available <http://www.arl.org/sc/models/oa.shtml> (Last accessed on 14.11.2007).
6. Arunachalam S, Open access: current development in India. Digital Library of Information and Technology. 2006. Available <http://dlist.sir.arizona.edu/1255/> (Last Accessed on 14.11.2007).
7. Haider J, The Geographic Distribution of Open Access Journals". Digital Library of Information and Technology. 2005. Available <http://dlist.sir.arizona.edu/939/> (Last accessed on 14.11.2007).
8. Institutional Repositories. Wikipedia. Available [http://en.wikipedia.org/wiki/Institutional\\_repositories](http://en.wikipedia.org/wiki/Institutional_repositories). (Last accessed on 11.11.2007).
9. Registry of Open Access Repositories (ROAR). Available <http://roar.eprints.org/index.php?action=browse> (Last accessed on 12.11.2007).
10. Registry of Open Access Repositories (ROAR). Available <http://roar.eprints.org/index.php?action=browse> (Last accessed on 12.11.2007).
11. Registry of Open Access Repositories (ROAR). Available <http://roar.eprints.org/index.php?action=browse> (Last accessed on 12.11.2007).
12. Cross Archive Search Services for Indian Repositories (CASSIR). Available <http://casin.ncsi.iisc.ernet.in/oai> (Last accessed on 14.11.2007).
13. Search Digital Libraries (SDL). Available <http://drtc.isibang.ac.in/sdl> (Last accessed on 13.11.2007).
14. SEED (Search Engine for Engineering Digital-repositories). Available <http://eprint.iitd.ac.in/seed/> (Last accessed on 23.11.2007).
15. SJPI Cross Journal Search Service. Available <http://144.16.72.144/harvester/> (Last accessed on 13.11.2007).
16. Open J-Gate. Available <http://www.openj-gate.com/> (Last accessed on 13.11.2007).
17. Arunachalam S, Workshops on open access in India, *Current Science*, 86 (12) (2004) 1589-90. Available <http://www.ias.ac.in/currsci/jun252004/1589.pdf> (Last accessed on 14.11.2007).
18. National Knowledge Commission recommendations on Libraries. National Knowledge Commission. Available <http://knowledgecommission.gov.in/recommendations/libraries.asp> (Last accessed on 14.11.2007).