Indian Contribution to Open Access Literature:

A Case Study of DOAJ & OpenDOAR

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ABSTRACT: India has been a cradle of knowledge for thousands of years. Presently it has significant advantages in the 21st century knowledge race due to one of the largest higher education system in the world. It generates a lot of information in the form of research papers, project reports, books, conference papers, theses, dissertations, articles, and so on. Therefore, it is necessary to preserve, manage and make it accessible to the academic community and society for sharing and visualizing their innovations for the betterment of society as a whole. The present study attempts to evaluate the initiatives taken by India to make this intellectual output accessible for all by publishing them in Open Access resources like Open Access journals and archiving them in Open Access archives or repositories. The results revealed that India is continuously contributing in Open Access literature as some of the premier institutions, particularly in the science and technology area, are providing Open Access to their research publications. The position of India in terms of number of journals in the Directory of Open Access Journals (DOAJ) is 7th, well ahead of countries such as China, Australia, and Japan and is sharing 10th position with the Sweden and Spain in Directory of Open Access Repositories (OpenDOAR) in terms of number of repositories in the world.

I. Introduction

India has been a cradle of knowledge for thousands of years. Presently it has significant advantages in the 21st century knowledge race. It has a large higher education sector, the third largest in the world in terms of number of students, after China and the United States (Altbach, 2005). There are over 350 universities and research institutes and more than 15,000 colleges in India (Satyanarayana & Babu,

2007). It spends about 170 billion rupees annually on science and technology research alone (Harnad, 2008). As a result, the research community -- faculty members, research scholars, students and scientists -- produces a lot of intellectual assets in form of research papers, project reports, books, conference papers, theses, dissertations, articles, etc. It is necessary to preserve, manage and make it accessible to the academic community and society for sharing and visualizing their innovations for the betterment of society as a whole. Otherwise, research papers published in an obscure, inaccessible or toll-based journal and not archived for the rest of the world is as good as not published (Sahu & Parmar, 2006). Therefore, the best way to make the information accessible to the major part of the world is to go for Open Access (OA) mode of publishing, which overcomes obstacles between information and user.

Open Access to literature is a key for providing universal access to information and knowledge. "Open Access" is a term used to describe a new method of access to literature, that is, any reader has access to literature on the Internet at no cost. The copyright owner -- usually the author -- allows the user to freely read, download, copy, print, distribute, search, link to the full text of the article, crawl it for indexing, convert the reported data to software, or use the article for any other lawful purpose (Kwan, 2003). The basic purpose of Open Access is to make intellectual output of scholars and scientists and their institutions more visible, accessible, harvestable, searchable and useable by any potential user with access to the Internet. For this grand goal, many countries and societies came forward and joined hands. Consequently, a number of initiatives like the Budapest Open Access Initiative (BOAI), Bethesda Statement on Open Access Publishing (BSOAP) and Berlin Declaration came into existence tor advocate and emphasize on Open Access.

Encouraged by these initiatives, many new developments took place in the Open Access movement. At the First Nordic Conference on Scholarly Communication in Lund/Copenhagen (http://www.lub.lu.se/ncsc2002), the idea of creating a comprehensive directory of Open Access Journals was discussed (DOAJ, 2008) and the dream came true in the same year. The Directory of Open Access Journals is hosted, maintained and partly funded by Lund University Libraries Head Office. The Directory of Open Access Journals (DOAJ) service covers free, full text, quality-controlled scientific and scholarly journals with the aim to cover all subjects and languages. To date, there are 3,756 journals in the directory, of which 1,312 journals are searchable at article level, and 2 22,595 articles are included in the DOAJ service (DOAJ, 2008).

The Massachusetts Institute of Technology (MIT) Libraries, with funding and collaboration from Hewlett Packard, created an institutional repository software called DSpace. DSpace was launched in November of 2002 as a free, open source system which any person or institution anywhere could download and run locally (Smith, 2004). Many institutions have utilized this open source software and created their own repositories. In 2005, the University of Nottingham, UK created the Directory of Open Access Repositories (OpenDOAR). The (OpenDOAR) is an authoritative

directory of academic Open Access repositories presently having over 1,281 repositories (OpenDOAR, 2008).

In June 2004, the Open Society Institute (OSI) funded $1,299,018 (USD) to support open-access projects that included developing the "Directory of Open Access Journals" (DOAJ) and special software; converting a "Subscription-Based Journal to Open Access" and "Guide to Launching a New Open Access Journal"; conducting international conferences, seminars and workshops to increase awareness of Open Access and supporting the creation of institutional repositories for Open Access articles (Guerrero & Piqueras, 2004). In nutshell, attempts are being conducted all over the world to gear up the open access movement for providing barrier free access to the information.

II. Open Access Movement/Initiatives in India

The Open Access movement in India is acknowledged worldwide. In India, it started modestly from a few institutions and now spread all over. The Indian Institute of Science was the first institution in the country to set up an interoperable institutional repository (ePrints@IISc), under the leadership of the late Dr. T. B. Rajashekar (Sahu & Parmar, 2006), and followed by Indian Institute of Management, Kozhikode; Indian Statistical Institute, Bangalore; Indian Institute of Technology, Delhi; National Institute of Technology, Rourkela; National Aerospace Laboratories, Bangalore; National Chemical Laboratory, Pune; Information and Library Network (INFLIBNET), Ahmedabad; National Institute of Oceanography, Goa; and Raman Research Institute, Bangalore (Ghosh & Das, 2006).

India has launched many new Open Access journals and converted some reputed subscribed-based journals to Open Access. The Open Access journals in India are mainly initiated by six journal publishers: Indian Academy of Sciences, Indian National Science Academy, Indian Medlars Centre of the National Informatics Centre, Medknow Publications, indianjournals.com, and Kamla-Raj Enterprises (Ghosh & Das, 2006). The movement is in progress as the many new institutes are becoming familiar with the advantages of open access publishing and continuously contributing in the different facets of open access.

III. Objective

The main objective of the study is to evaluate India's contribution in the two primary vehicles for delivering Open Access literature: Directory of Open Access Journals (DOAJ) and Directory of Open Access Repositories (OpenDOAR).

IV. Scope

The scope of this study is limited to the Directory of Open Access Journals (DOAJ) and the Directory of Open Access Repositories (OpenDOAR). The Directory of Open

Access Journals (DOAJ) contains research papers and articles published in reputed Open Access journals from different countries whereas the Directory of Open Access Repositories (OpenDOAR) archives books, theses, monographs, patents, learning objects, unpublished papers, and many others.

V. Methodology

The research began with literature review on the Open Access movement in India and abroad. Then, the Directory of Open Access Journals (DOAJ) and Directory of Open Access Repositories (OpenDOAR) were accessed to get the data related to the study. In the final stage, the data were interpreted and analysed based on a set of parameters to get the right picture of India's contribution to Open Access literature.

VI. Data Interpretation & Analysis

1. India's Contribution to Directory of Open Access Journals

i. India's contribution to DOAJ

In terms of the number of journals, Indian ranks number 7 in the Directory of Open Access Journals (DOAJ), well ahead of countries such as China, Australia, and Japan. The top ten countries as per journal in the Directory of Open Access Journals (DOAJ) are listed in Table 1.

Table 1: Top 10 Countries in DOAJ

No.	Country	Number of Journals
1.	U.S.A.	795
2.	Brazil	348
3.	UK	320
4.	Spain	210
5.	Germany	144
6.	Canada	107
7.	India	105
8.	Turkey	102
9.	Japan	97
10.	Chile	93

ii. India's contribution by year

India was not among the countries which contributed their journals to the Directory of Open Access Journals (DOAJ) when it was created in 2002. Since 2003, India has contributed to DOAJ continuously as shown in Table 2.

Table 2: India's Contribution by Year

Year	Number of Journals	Cumulative Total
2002	00	00
2003	16	16
2004	20	36
2005	15	51
2006	18	69
2007	21	90
Jan. to Sept., 2008	15	105

iii. India's contribution by publishing date

The Indian journals in DOAJ are mostly published since 1990's when the World Wide Web was born. However, two old journals, published prior to Indian's independence (Journal of Genetics in 1910 and Current Science in 1932), have also been included. Table 3 below shows that most of India's journals in DOAJ were published in the 21st century.

Table 3: No. of Journals by Date

Date of Publication	No. of Journals
Up to 1989	7
1990-1999	7
2000	9
2001	7
2002	6
2003	11
2004	10
2005	16
2006	11
2007	12
Jan.-Sept., 2008	9
Total	105

iv. India's contribution to DOAJ by publisher

India's journals in DOAJ are mainly published by three Indian journal publishers: Medknow Publications, Indian Academy of Sciences, and Kamla-Raj Enterprises. However, there are 40 Indian publishers in total, of which 36 publish one journal each. Besides, two journals are published from Jammu and Kashmir, namely JK Science:

Journal of Medical Education and Research by JK Science and Vet Scan by Kashvet Society, Kashmir.

Table 4: No. of Journals by Publisher

No.	Publisher	Journals Published
1.	Medknow Publications	50
2.	Indian Academy of Sciences	10
3.	Kamla-Raj Enterprises	7
4.	Indian Council of Medical Research	2
5.	Others	36
Total		105

v. India's contribution by subject

The Indian journals in DOAJ have contributed to different subject areas of human knowledge: public health & medical sciences, general sciences, social sciences, agricultural sciences, engineering, information science, computer science, and law. The journals related to public health & medical sciences are more in number (63.80% of total journals), followed by general sciences (16.19%), social sciences (9.52%), and agricultural sciences (4.76%) respectively.

Table 5: Journals by Subject

No.	Subject	No. of Journals	Percentage
1.	Public Health & Medical Sciences	67	63.81
2.	General Sciences	17	16.19
3.	Social Sciences	10	9.52
4.	Agricultural Sciences	5	4.76
5.	Engineering	3	2.86
6.	Computer Science/ Information Science	2	1.90
7.	Law	1	0.96
Total		105	100

2. India's Contribution to Directory of Open Access Repositories

i. Contribution by no. of repositories

India shares 10th position with the Spain and Sweden in OpenDOAR in terms of number of repositories in the world whereas it is second in Asia after Japan. The top ten countries which have maximum contribution to OpenDOAR in terms of number of repositories are listed in Table 6.

Table 6: Top 10 Countries in OpenDOAR

No.	Country	Repositories
1.	USA	322
2.	UK	138
3.	Germany	129
4.	Japan	69
5.	Australia	60
6.	Netherlands	45
7.	Canada	44
8.	Italy	42
9.	France	40
10.	India/ Sweden/Spain	30

ii. India's contribution by subject

The 66% of India's repositories in OpenDOAR are subject specific and only 34% are multidisplinary. The subject specific repositories are mostly related to the science & technology rather than social sciences and humanities.

Table 7: Repositories by Subject

No.	Subject	Repositories
1.	General Science	2
2.	Physics and Astronomy	5
3.	Chemistry and Chemical Technology	4
4.	Biology and Bio-chemistry	1
5.	Health & Medicine	1
6.	Technology General	4
7.	Computer & Information Technology	1
8.	Library & Information Science	3
9.	Mathematics & Statistics	5
10.	Business and Economics	2
11.	Engineering	2
12.	Arts and Humanities	1
13.	Multidisplinary	11

iii. Documents archived in India's repositories

Most of India's repositories in OpenDOAR archive a variety of information sources such as articles, conference papers, theses, books, patents, and many others whereas

some repositories are document specific that is, archiving only one type of document like theses. However, articles, conference papers, theses, and unpublished papers are archived by maximum number of repositories as revealed by Table 8.

Table 8: Document Type

No.	Type of Document	Repositories
1.	Articles	23
2.	Conference papers	17
3.	Theses	16
4.	Unpublished papers	11
5.	Learning objects	7
6.	Books	6
7.	Special	6
8.	Patents	5
9.	Multimedia	5
10.	References	1

iv. India's contribution by item

India's repositories in OpenDOAR have archived 83,780 items in total, of which DSpace at Vidyanidhi archived 54,778 items alone.

Table 9: Repositories by Item

No.	No. of Items	Repositories
1.	Less than 500	19
2.	500-1000	2
3.	1000-2000	3
4.	2000-3000	1
5.	Above 3000	5

v. India's contribution by language

All India's repositories in OpenDOAR archive documents written in English language. However, three India's repositories also archive information sources written in Hindi language and one in Kannada language.

Table 10: Repositories by Language

No.	Language	Repositories
1.	English	30
2.	Hindi	3
3.	Kannada	1

VII. Conclusion

The Open Access movement is gaining momentum in India. With the availability of advanced information and communication technologies (ICTs) and by building up necessary information infrastructure in institutes of higher learning, India becomes an active contributor to global Open Access literature by establishing Open Access archives, institutional repositories, document specific repositories, and subject specific repositories, and by launching Open Access journals and converting subscription-based journals. India's research community has become aware of the benefits of Open Access publishing as it overcomes financial, institutional, legal, time and space barriers between information and user on one hand and on the other, it increases accessibility, brings greater visibility and impact, gears the research, enables better assessment of research, increases quality of research, and avoids duplicate efforts in research. Indian researchers are continuously contributing to Open Access literature as some of the premier institutions, particularly in the science and technology area, are providing Open Access to their research publications.

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Submitted to CLIEJ on 29 October 2008.

Fayaz Lone, Rafiq Rather, & Gh. Jeelani Shah. (2008). Indian contribution to open access literature: A case study of DOAJ & OpenDOAR. *Chinese Librarianship: an International Electronic Journal*, 26. URL: http://www.iclc.us/cliej/cl26fayaz.pdf