

Open Access Digital Repositories in Asia: Current Status and Future Prospects

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Abstract

The present study attempts to identify the contribution of Asian countries in the Directory of Open Access Repositories (OpenDOAR). The OpenDOAR is an authoritative directory of academic open access repositories, listed 2,299 repositories in the month of June 2013 when the data were collected. Data were later presented in tabular forms and analysed using quantitative techniques to reveal findings in accordance with desired objectives. The results reveal that Asia is the third largest region in terms of number of open access repositories in the world after Europe and North America contributing 400 (17.40%) repositories out of 2299 in all. The highest number of repositories in Asia is contributed by Japan (138, 34.50%) followed by both India and Taiwan (58, 14.50%). The linguistic assessment shows that most of Asian repositories (305, 76.25%) accept contents written in English language followed respectively by Japanese (137, 34.25%) and Chinese (91, 22.75%). The majority of the repositories is created by the higher institutions (374, 93.50%) like universities and research centres dealing with various branches of knowledge. Most of these repositories are multi-disciplinary (268, 67.00%) whereas more than 10% is related exclusively to Technology (10.75%, 43) and Health/Medicinal Sciences (10.50%, 42). These repositories archive various types of materials and most of the repositories preserve articles (81.50%), theses (52.50%), conference proceedings (35.40%) and books (26.50%). The administrators have used twenty one (21) software brands to manage 400 repositories in which *DSpace* is used by the maximum (275, 67.85%) and its second competitor is *Eprints* used only by (56) 14.00% of repositories. The study revealed various facts however; findings should be cautioned as the scope of the study is limited only to the OpenDOAR.

Keywords: Open Access Repositories, digital repositories, institutional repositories, Asian repositories

Introduction

Open Access to the literature is a key to provide universal access to information and knowledge. Open Access (OA) is a term used to describe a new method of accessing literature in which any reader has right to access literature on the Internet free of cost. Open access to the literature means the free availability of the literature on the public Internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other

lawful purpose, without any financial, legal, or technical barriers other than those inseparable from gaining access to the Internet itself (Suber, 2003). Pinfield (2005) defines open access as free, immediate and unrestricted availability of content. Open access refers to the free and unrestricted access on the public Internet to the literature that scholars provide to the world without expectation of direct payment (Prosser, 2003). The basic purpose of the open access is to make the intellectual output of researchers and their institutions more visible, accessible, harvestable, searchable and useable by any potential user with access to the Internet. There are two primary roads to open access: the 'golden' road (publish articles in an OA journal) and the 'green' road (publish articles in a non-OA journal, but also self-archive it in an OA repository) (Harnad et al., 2004). There are of course other open access media such as personal websites, blogs, and discussion forums among many others. Compared to other models, open access repository model is considered the best to attain quick universal access and viable platforms for sharing of knowledge worldwide.

Open access digital repositories have attracted great attention from the academic and research communities worldwide over the past several years. According to Hayes (2005), "Digital repository is where digital contents and assets are stored and can be searched and retrieved for later use". The term 'digital repository' may also be used to refer to the organisation that is responsible for the long-term maintenance of digital resources and for making these resources available to the public or specified communities of users. Thus, open access digital repository is an online database which makes the full text of items freely and immediately available to information seekers without any access restrictions.

Digital repositories were created as an attempt to use the power of the Internet to provide an alternative and cheaper form of access to research literature. It supports mechanisms to import, export, identify, store and retrieve digital assets. In 2005, University of Nottingham, UK created the Directory of Open Access Repositories (OpenDOAR). The OpenDOAR is an authoritative directory of academic open access repositories listing 2,299 repositories as on date (<http://www.opendoar.org>; accessed, June 01-19, 2013).

Literature Review

The Open access movement is gaining momentum worldwide in general and Asian countries in particular. Wang and Su (2007) stated that although open access started with developed countries, it is appealing to developing countries and is spreading throughout the world quickly. Fayaz and Rather (2007) reported that OpenDOAR listed 792 repositories on October 15, 2006 in which the major share is from developed nations of the world. Cullen and Chawner (2009) also reported that institutional repositories are now established in all continents with the largest repositories being found in Europe, North and South America, Japan, India and Australia. Roy, Biswas, and Mukhopadhyay (2012) revealed that Europe and North America contributed as much as 920 and 470 repositories respectively whereas Asia contributed only 330 repositories. Most of Asian countries are in developing phase in open access movement; it is evident that the growth rate of repositories of Asian countries is quite low in compared to other developed countries. Nazim and Mukherjee (2011) found that the contribution of all Asian countries is less than the USA alone as it contributed about 400 institutional repositories. However, in Asia few countries are actively taking part in the open access movement. Lone, Rather, and Shah (2008) revealed that India shared 10th position with Spain and Sweden in OpenDOAR in terms of number of repositories in the world and

ranked the second in Asia after Japan in 2008. Abrizah, Noorhidawati and Kiran (2010) classified Asian countries in ascending order according to the number of repositories and ranked Japan on top followed by India and Taiwan. An investigation of the status of these repositories revealed that out of the 191 Asian institutional repositories identified in the study, only 48 are listed in the top 400 Ranking Web of World Repositories (RWWR). Matsuura (2008) reported that Japan has been placed as the fourth biggest contributor in terms of institutional repositories listed in the OpenDOAR and Registry of Open Access Repositories (ROAR). According to the researcher, all the Japanese institutional repositories can be accessed both individually and collectively through a single web portal called JAIRO (Japanese Institutional Repositories Online). Like previous studies, Prabhat and Gautam (2010) explored the Indian institutional repositories registered in the ROAR during February 2010 and placed India as the second in Asian region as a contributor to the world institutional repositories. Out of the 221 Asian institutional repositories, they found 49 (22.2%) are from India. Sengupta (2012) conducted a study on subject specific repositories and depicted that out of 13 open access repositories contributed by Asian countries in the field of Library & Information Science, India ranks first by having (4) followed by Taiwan (3) and Malaysia (2) respectively. Lee-Hwa, Abrizah and Noorhidawati (2013) conducted a study about ASEAN countries and obtained data from the OpenDOAR, ROAR and RWWR. Findings showed that the total number of digital repositories in ASEAN is 51 with Indonesia as the biggest contributor (20, 39 percent), followed by Malaysia (17, 33 percent) and Thailand (7, 13 percent). Out of the 51 ASEAN digital repositories identified from OpenDOAR and ROAR, only 23 (45 percent) are listed in RWWR. Chen and Hsiang (2009) revealed that open access repositories are not widespread and the percentage of institutional repository systems in Asian countries are about 4-10 percent except in mainland China which has a centralized institutional repository system for about 300 universities. Zhong (2009) used data from the ROAR and found only 27 Chinese institutional repositories, listed separately under China mainland (15), Hong Kong (3), and Taiwan (16). The author blamed for the small number to lack of awareness among potential contributors and lack of government policies on institutional repository implementation. Kiran and Chia (2009) identified 12 institutional repositories in Malaysia; all of them are maintained by universities. Islam and Akhter (2013) found that in Bangladesh, only three organizations have their institutional repository and rest face some problems that impede the process of building an open access institutional repository.

A number of studies have been conducted all over the world on digital repositories in general and on Asian repositories in particular. At global level, Asia lacks behind Europe and North America in contributing to green road of open access. However, a good number of countries from Asia have created digital repositories among them Japan, India, Taiwan and China are the key players in terms of number of repositories. Japan is the fourth biggest contributor in terms of institutional repositories all over the world and also provides access to all Japanese institutional repositories both individually and collectively through a single web portal called Japanese Institutional Repositories Online (JAIRO) for optimum utilization of information. Other Asian countries have also made their presence in spite of various challenges like lack of awareness, lack of policies and lack of expertise. Moreover, only few Asian repositories found their place in the Ranking Web of World Repositories. The present study will also analyse the contribution of Asian countries in the open access repositories to

identify the present status for future directions.

Statement of Problem

Asia is the world's largest and most populous continent hosting almost 51 countries of the world like China, Japan, India, Iran, etc. It is also the homeland of many higher educational and research institutions with world class research and education facilities. Due to their research output, many of these institutes have found their place in the world ranking of global institutions. Asian countries have not only accelerated the speed of research and creation of knowledge, but also start archiving and sharing it among the global partners through open access mode. Like the other reputed countries of the world, Asian countries have also joined hands in the open access movement and have created many open access digital repositories to archive their research output for use of present and future generation. Therefore, the need is to study the contribution of Asian countries in the (OpenDOAR).

Objective of the Study

The present study aims to assess the contribution of Asian countries in the OpenDOAR which includes:

- To identify the region-wise number of repositories in the world
- To identify the country-wise number of repositories in Asia
- To identify the language-wise number of repositories in Asia
- To identify the subject-wise number of repositories in Asia
- To identify the repository type-wise number of repositories in Asia
- To identify the content types available in the repositories of Asian countries
- To identify the software used by these repositories in managing the information.

Methodology

The online survey method of research was used for data collection and quantitative approach was applied for data analysis. In the present study, the data were collected about four hundred Asian repositories from the OpenDOAR that provides information about country, subject, language(s), content(s) and many other features. The OpenDOAR was accessed from June 01-19, 2013 to collect data. An excel file of the collected data was created, and data were analysed using mathematical formulae. Data were later presented in tabular forms to show findings in accordance with desired objectives.

Data Analysis

Repositories by Region

The results reveal that Asia is the third largest region in terms of the number of open access repositories in the world after Europe and North America. Europe has contributed 1,090 (47.41%), North America 475 (20.66%) and Asia 400 (17.40%) repositories out of 2,299 in OpenDOAR (Table 1).

Table 1

Total number of Repositories in OpenDOAR (2299)

	Region	No. of repositories	Percentage
1	Europe	1090	47.41
2	North America	475	20.66
3	Asia	400	17.40
4	South America	183	7.96
5	Africa	64	2.78
6	Australasia	58	2.52
7	Caribbean	15	0.65
8	Central America	10	0.43
9	Oceania	3	0.13
10	Unknown	2	0.09

Repositories by Countries

The findings depict that twenty seven (27) Asian countries have contributed in the OpenDOAR until the date in which the highest number of repositories (138, 34.50%) is contributed by Japan and second position is shared by India and Taiwan (58, 14.50%) whereas third by China (33, 8.25%) (Table 2).

Table 2

Country-wise Number of Repositories in Asia (400)

	Region	No. of repositories	Percentage
1.	Japan	138	34.50
2.	India	58	14.50
3.	Taiwan	58	14.50
4.	China	33	8.25
5.	Indonesia	25	6.25
6.	Malaysia	16	4.00
7.	Turkey	15	3.75
8.	Korea	12	3.00
9.	Thailand	8	2.00
10.	Saudi Arabia	5	1.25
11.	Iran	4	1.00
12.	Bangladesh	3	0.75
13.	Pakistan	3	0.75
14.	Philippines	3	0.75
15.	Singapore	3	0.75
16.	Georgia	2	0.50
17.	Israel	2	0.50
18.	Kyrgyzstan	2	0.50
19.	Sri Lanka	2	0.50
20.	Afghanistan	1	0.25
21.	Azerbaijan	1	0.25
22.	Iraq	1	0.25
23.	Kazakhstan	1	0.25
24.	Lebanon	1	0.25

	Region	No. of repositories	Percentage
25.	Nepal	1	0.25
26.	Qatar	1	0.25
27.	Viet Nam	1	0.25

Repositories by Languages

The linguistic assessment shows that Asian repositories archive contents written in twenty eight (28) languages, mostly of Asian origin. Most of the repositories (305, 76.25%) accept contents written in English language followed respectively by Japanese (137, 34.25%) and Chinese (91, 22.75%) (Table 3).

Table 3

Language-Wise Number of Repositories in Asia (400)

	Language	No. of repositories	Percentage
1.	English	305	76.25
2.	Japanese	137	34.25
3.	Chinese	91	22.75
4.	Indonesian	14	3.50
5.	Turkish	14	3.50
6.	Korean	12	3.00
7.	Arabic	10	2.50
8.	Malay	8	2.00
9.	Thai	7	1.75
10.	Hindi	6	1.50
11.	Persian	5	1.25
12.	Russian	4	1.00
13.	German	3	0.75
14.	French	2	0.50
15.	Georgian	2	0.50
16.	Kannada	2	0.50
17.	Malayalam	2	0.50
18.	Azerbaijani	1	0.25
19.	Bengali	1	0.25
20.	Gujarati	1	0.25
21.	Kazakh	1	0.25
22.	Latin	1	0.25
23.	Marathi	1	0.25
24.	Nepali	1	0.25
25.	Pashto	1	0.25
26.	Sanskrit	1	0.25
27.	Spanish	1	0.25
28.	Vietnamese	1	0.25

Note: Multilingual repositories are also available in Asia

Repositories by Subject

The OpenDOAR divides the repositories in six (6) types based on subjects covered by them. The highest number of repositories is multi-disciplinary (268, 67.00%) allowing contents for

archiving and access to any branch of knowledge from Acoustics to Zoology. Among the subject-specific repositories, 10.75% is related to Technology and 10.50% on Health & Medicine and 8.00% on General Science. A small percentage of repositories covers Arts & Humanities (3.75%) and Social Sciences (3.00%) as well (Table 4).

Table 4

Subject-Wise Number of Repositories in Asia (400)

	Region	No. of Repositories	Percentage
1.	Multidisciplinary	268	67.00
2.	Technology General	43	10.75
3.	Health & Medicine	42	10.50
4.	Science General	32	8.00
5.	Arts & Humanities	15	3.75
6.	Social Sciences	12	3.00

Note: Twelve repositories are included in more than one subject

Repositories Types

Maximum number of repositories are institutional (374, 93.50%) created and maintained by institutions whereas a small percentage of repositories is disciplinary (3.25%) designed to promote disciplines, aggregating (2.50%) created by individual units after joining hands and sharing responsibilities and governmental (0.75%) dealing with affairs or structure of government or state (Table 5).

Table 5

Type-Wise Number of Repositories in Asia (400)

	Type	No. of repositories	Percentage
1.	Institutional	374	93.5
2.	Disciplinary	13	3.25
3.	Aggregating	10	2.50
4.	Governmental	03	0.75

Repositories by Content Types

Most of the Asian repositories archive a variety of information sources such as articles, theses, conference papers, books, patents, and many others whereas some repositories is document specific that is, archiving only one type of document like theses. However, articles are archived by most of the repositories (326, 81.50%), followed by theses (210, 52.50%), conference papers (142, 35.50%) and books (106, 26.50%) (Table 6).

Table 6

Content-Wise Number of Repositories in Asia (400)

	Type	No. of repositories	Percentage
1.	Articles	326	81.50
2.	Theses	210	52.50
3.	Conferences	142	35.50
4.	Books	106	26.50
5.	References	76	19.00

	Type	No. of repositories	Percentage
6.	Learning objects	65	16.25
7.	Multimedia	65	16.25
8.	Patents	29	7.25
9.	Datasets	05	1.25
10.	Special	05	1.25
11.	Software	02	0.50
12.	Unpublished	49	12.25

Note: Multi-content repositories are also available

Repositories by Software Used

Asian repositories use twenty one (21) software brands to manage the contents of four hundred (400) repositories in which some are open source and some commercial. The majority of the repositories use open source software like the *DSpace* (275, 68.75%) and the *Eprints* (56, 14.00%) to design and manage their contents (Table 7).

Table 7

Software Used in Asian Repositories (400)

	Software	No. of Repositories	Percentage
1.	Dspace	275	68.75
2.	EPrints	56	14.00
3.	XoonIps	13	3.25
4.	MiTOS	7	1.75
5.	Greenstone	06	1.50
6.	e-Repository	5	1.25
7.	Earmas	5	1.25
8.	Not Specified	16	4.00
9.	Digital Commons	2	0.50
10.	Infolib-DBR	2	0.50
11.	iLiswave-J	2	0.50
12.	InfoLib-DBR	2	0.50
13.	ETD-db	1	0.25
14.	IR+	1	0.25
15.	Open Repository	1	0.25
16.	iLisSurf	1	0.25
17.	InfoLib	1	0.25
18.	InmagiDBText Works	1	0.25
19.	NALIS-R	1	0.25
20.	Nitya	1	0.25
21.	Shunsaku	1	0.25

Discussion

The open access movement is on the rise in Asian countries. Asia becomes an active contributor to the global open access movement by establishing open access archives, institutional repositories, document specific repositories, and subject specific repositories. However, Asian countries need to take few concrete steps to accelerate the movement and reap the benefits of open access. Most of the countries of Asia have already started to preserve

their contents in the digital repositories for use and posterity of academic and research communities of the global village. The developing and under-developed countries also need to contribute according to their capacity in this direction to bridge the information gap between the information-rich countries (information have's) and information-poor countries (information have-not's). Matsuura (2008) reported that there is a single web portal called JAIRO (Japanese Institutional Repositories Online) in Japan for accessing the contents of all digital repositories. All the countries, including India need to have such a portal to increase use of contents of digital repositories. The Information and Library Network (INFLIBNET) in India can help in this direction. Another alternative is to have a common *National Digital Repository* like the National Library of India for archiving, preserving and accessing the digital contents for the use of present and future generations.

The open access repositories are crossing the linguistic boundaries, and information is available in almost all the influential languages of Asia. The need is to archive the contents written in local languages as Asia is the homeland of hundreds of languages. Most Asian countries have more than one language that is natively spoken. For instance, according to Ethnologue (2013a), there are 2304 living languages in Asia speaking in various regions in which 1254 are speaking in South-Eastern Asia, 660 are in South Asia, 288 are in Eastern Asia, 89 are in Western Asia, and 13 are in Central Asia. Ethnologue (2013b) also reports that the number of individual languages listed for India is 461. Of these, 447 are living and 14 are extinct. In India, it is a matter of concern that only few repositories archive materials in local languages. All the states of India should create *State Digital Repositories* to archive contents written in local languages for use by their own people. The state repositories need to be interconnected with the *National Digital Repository* and accessed from a single platform as well. Other countries also need to follow same roadmap to preserve and access information sources of diverse languages.

The open access repositories also contain information on all subject areas and the majority of the repositories archive contents on all branches of knowledge. The subject-specific repositories are mostly related to the science & technology rather than social sciences and humanities. The social sciences and humanities' research output also needs to be preserved in digital repositories. In India creating subject-specific repositories in these disciplines and awaring authors to deposit their research output in them is a duty of leading research centres like the Indian Council of Social Science Research (ICSSR) and library and information managers (LIMs). The benefits of establishing these institutional repositories, includes the opportunity to provide a wider range of educational resources to academic community free of cost and also increase the h-index of the institution vis-à-vis institution's scholarly reputation. The global visibility of these repositories needs to be increased by allowing all the search tools to harvest their contents. This will not only increase their visibility, but also citations and impact. Moreover, Asian repositories archive a variety of information sources such as articles, theses, conference papers, books, patents, theses, dissertations and many others. These sources are only digital versions of print sources or born only digital sources, but still are considered low graded as compared to print sources, especially by old generation citizens. There is a need to evaluate the information to check its quality before preserving the contents in digital repositories. The contents stored shouldn't be biased towards any region, religion, caste, colour, creed or sex. Such contents which will create more harm than good should always be avoided. Moreover, the plagiarism software

like *Turnitin*, *Plagiarism Detector*, etc. must be used to check its credibility and authenticity before archiving in repositories.

When the question of software arises in managing digital repositories, *DSpace* has no second close competitor all over the world. There are a number of noteworthy features of the *DSpace* that most repository managers find more suitable for their needs like flexibility, customizable, interoperability, greater visibility, searchability and free availability. There are many other commercial and open source software brands used by the repository managers. However, the need is to tap the experiences of various professionals for upgrading the software and making these more user-friendly. Information and technology experts and computer scientists can provide a helping hand in this direction. Library and information managers (LIMs) have also to update their knowledge about new developments within this field and practically implement them at a ground level.

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