



Exploring the Growth of Indian Open Access Repositories: Insights from OpenDOAR

Rakhi Dhibar

(Faculty of Bankura University)

Abstract:

Nowadays, open-access repositories play an important role in higher education. These repositories provide unlimited access to scholarly works such as journal articles, theses, and conference papers over the Internet. This study investigates the contributions of Indian open-access repositories indexed in OpenDOAR as of November 2024, focusing on parameters such as growth trends, repository types, management software, content diversity, subject domains, and OAI-PMH compliance. The findings reveal that India hosts 111 repositories, with the highest growth recorded in 2013 (11.71%). Institutional repositories 85.59% make up the majority, while DSpace with 58.33% is the dominant repository management software. Journal articles 72.07% and theses and dissertations 56.76% are the most commonly archived content, with a strong representation of scientific disciplines in 83.78% of repositories. Additionally, 62.16% follow OAI-PMH standards, facilitating metadata harvesting and enhancing interoperability. This study underscores the significance of Indian open-access repositories in promoting scholarly communication and knowledge sharing within the global academic community.

Introduction:

UNESCO defines Open Access as "By 'open access' to the literature, we mean its free availability 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 financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself." Lone et al. (2008) the main goal of open access is that intellectual outputs are accessible, searchable, usable, and harvestable by any user over the Internet connection for scientists, librarians, academicians, and institutions. Open-access repositories are platforms that provide free, unrestricted access to scholarly works, usually peer-reviewed journal articles, conference papers, theses, and dissertations.

In the current academic landscape, the Directory of Open Access Repositories (OpenDOAR) plays a pivotal role in enhancing access to scholarly research and promoting the values of open access. OpenDOAR serves as a centralized directory of open-access repositories, simplifying the process for researchers, students, faculty members, and librarians to access valuable scholarly materials. It provides a comprehensive list of repositories from around the globe, allowing users to search by country, repository name, and other criteria to access scholarly materials such as articles, theses, and datasets—all available free of cost.

These repositories act as digital platforms for hosting scholarly publications and research outputs, fostering a culture of knowledge sharing and open access. The University of Nottingham maintains OpenDOAR under the umbrella of SHERPA services. It was initially developed in collaboration with Lund University in 2005. (Wikipedia contributors, 2024)

Present-day Institutional repositories (IRs) play a dynamic role in promoting higher education in the world. IRs are digital platforms operated by academic institutions such as universities, research organizations, and libraries to store, preserve, and disseminate the

scholarly output produced by their faculty, researchers, and students. These repositories involve a varied range of research articles, theses, dissertations, conference papers, and datasets.

Literature Review:

During the literature review on the topic of open access repositories, particularly focusing on OpenDOAR and related areas, a significant number of articles were identified. However, for this paper, only a selected few have been included to ensure relevance and focus on the latest advancements in the field (Naqvi, 2021).

Nayak and Parhi (2021) evaluated the present status of Open Access Institutional Repositories (OAIRs) in China, highlighting their implication in promoting higher education and research. According to this paper's highest result, 36.84% of IRs were registered in 2011, 92.98% of repositories were Institutional Repository, 64.91% widely used DSpace to manage the repository content, 54.64% of repository contents in Chinese language and 18.44% of IRs in a science discipline.

Kuri and Singh (2020) evaluated Indian Institutional Repositories (IRs) reflected in the Directory of Open Access Repository (DOAR) that out of 5414, 96 repositories were from India. This study revealed that out of 96 institutional repositories highest i.e. 13 (13.54%) IRs were registered in 2013, 81 (84.38%) repositories were Institutional repositories, a maximum of 54 i.e. 56.25% used DSpace Software, 95 i.e. 79.17% preferred English language & Majority i.e. 58(20.28%) consist Science in general.

Karadia and Sahoo (2021) conducted a Comparative Study of Indian and Australian Open Access Repositories in OpenDOAR. As of May 2021, 98 repositories were from India and 90 were from Australia. The result revealed that India had the greatest registration rate in the Open Access Repository with greater awareness of registration, compared to Australia. Using Dspace Open Sources Software, India (56%) and Australia (22%) were creating open-access repositories. E-Print was widely utilized for open-access repositories, with India accounting for 33% of registrations and Australia contributing 12% in OpenDOAR.

Wani and Astunkar (2021) investigated Open Access Repositories in OpenDOAR of Asian Countries (India, Japan, China, & Indonesia) and the authors concluded that Japan had the highest number of open access repository registrations in 2021. According to the report, only institutional repositories in Indonesia (160) and Japan (682) regarding open access repositories existed. Japan had the most multidisciplinary open access repositories (340) out of these four countries, compared to China's 22, Indonesia's 126, and India's 49. English is the language of choice for content uploads in all four Asian countries: Japan (199), China (46), Indonesia (66), and India (96). Repository for Open Access. D-Space open source Software is employed as an open-access repository by Japan (8%), China (60%), Indonesia (9%), India (56%), and Indonesia (6%). Additionally, India utilizes other platforms such as Drupal and Greenstone.

Gurikar and Hadagali (2021) presented a concise summary of the application of Open Source Software (OSS) in developing Institutional Repositories (IRs) in India. Their study revealed that DSpace and EPrints were the most commonly used OSS. Furthermore, Karnataka, New Delhi, and Maharashtra have made notable advancements in establishing Institutional Digital Repositories (IDRs) using OSS and OSS have been particularly utilized in the fields of Science, Technology, Health, and Medicine to develop Institutional Digital Repositories (IDRs).

Nayak and Mohapatra (2021) highlighted the BIMSTEC countries' open-access IRs. A total of 150 IRs were found in this study, with the highest registrations occurring in 2013 and 2019. Of these, 143 repositories (7.14%) had chosen the English language, followed by software especially DSpace (67.33%) and Eprints (21.33%). India registered with the highest no. of repositories among these countries with 98(65.33%) repositories. Journal articles and these dissertations were archived in the greatest number of repositories with 23.27% and 17.40% of total repositories, respectively.

Nazim et al. (2022) studied Open access publishing in India: trends and policy perspectives, and the findings of this are India has 317 journals and 98 repositories, placing it 15th and 17th in the world, respectively, for open access journals and repositories. To share of open access (OA) publications is 23% in India which is 7% less than the global average of 30%; however, the country's OA publication growth rate is approximately 18% annually. Only three of the 18 universities featured in the ROARMAP have defined the embargo time, indicating that while governing authorities and institutions have made attempts to require academics to adopt open-access publishing and self-archiving, the adoption rate among Indian researchers is very low. Despite requirements that research be uploaded in open access (OA) repositories, funding agencies in India do not offer financial support to writers for the

payment of Article Processing Charges. Although it does not yet have a national OA strategy, India intends to adopt the "one nation one subscription" formula to provide OA to scientific literature to all its citizens.

Sharma (2018) evaluated open-access repositories in Asia, as identified through OpenDOAR. The study found that India ranks second in the number of Open Access Repositories, followed by Japan. Most of these repositories are institutional. DSpace emerged as the most commonly used software, with the majority of repositories being multidisciplinary, with a strong emphasis on health and medicine.

Chirwa and Mnzava (2017) analyzed the contribution of East Africa in Open Access Literature from Open DOAR. This paper analyzed the position of East African countries in disseminating open-access literature in Africa and globally and determined the contribution of each East African country to global open-access literature in different parameters such as language, software, and subject-wise evaluation.

Keywords: Open DOAR, Digital Repository, Repository software, OAI-PMH, India

Statement of the Problem:

Open DOAR plays a crucial role in connecting users with institutional repositories and promoting open access to scholarly research on a global scale. Day by day the number of repositories is expected to grow. This study investigates Open Access Repositories in India, focusing on parameters such as yearly progression, type of repository, repository management software, content types, subject area, and OAI-PMH compliance.

Scope and Limitations of the Study:

India is the third largest country in the world to the contribution of a publicly funded higher education system. (https://en.wikipedia.org/wiki/Higher_education_in_India#). To understand India's role in OpenDOAR, this analysis focuses specifically on the open access repositories listed in OpenDOAR. The scope of this study is restricted to India and data is available until November 2024.

Objectives of the study:

- 1. Analyze the yearly progression and characteristics of Indian Repositories in the parameter of types of repositories and repository management software used by Indian OpenDOAR
- 2. Evaluate the content diversity and subject domains represented of these repositories
- 3. To determine OAI-PMH protocol support among Indian repositories, facilitating metadata harvesting and interoperability

Methodology:

The study adopted a quantitative method to achieve the objectives. This study is conducted by an online survey method. The data are collected from the Open DOAR website specially focused on the Indian Repositories. At present time November 2024, there are 111 repositories are indexed from OpenDOAR. Data are analyzed in an Excel file and represented in tabular form to show the findings following the intended goals.

Data Analysis and Interpretation of Data:

Table 1: Yearly Progression and Growth Trend of Digital Repository

Year	No. Of Repositories	Percentage (%)
2005	2	1.8
2006	10	9
2007	6	5.41
2008	5	4.51
2009	3	2.7
2010	6	5.41
2011	11	9.91
2012	2	1.8

2013	13	11.71
2014	2	1.8
2015	9	8.11
2016	5	4.5
2017	3	2.7
2018	0	0
2019	12	10.81
2020	6	5.41
2021	6	5.41
2022	4	3.6
2023	1	0.9
2024	5	4.51
Total	111	100

Table 1: Yearly Progression and Growth Pattern of Repository

Table 1 represents the annual growth of repositories in India from 2005 to 2024 with an overall 111 repositories distributed over the years. The data reveals the highest activity was recorded in 2013 with 13 repositories i.e. 11.71% of the total and then 12 with 10.81% and 11 (9.91%) repositories were added in 2019 and 2011 respectively. On the other hand, negligible activity was observed in 2018 with no repository added and in 2023 only one repository (0.9%) was recorded.

Table 2: Distribution of the digital repository with Type Context:

Type Of Repository	No of Repositories	Percentage (%)
Institutional	95	85.59
Disciplinary	8	7.2
Aggregating	6	5.41
Governmental	2	1.8
Total	111	100

Table 2 analyses different types of digital repositories with a major share of Institutional Repositories at 85.59% (95 repositories) of the total. Institutional Repositories are those repositories established by universities, research institutes, or other academic institutions to collect, preserve, and disseminate the intellectual output of their societies. 7.20% (8 repositories) are Disciplinary those repositories only focus on specific academic disciplines or subjects and they collect and provide access to research outputs related to a particular field. 6 i.e. 5.41% of repositories are Aggregating which is gathering content from various sources, including institutional and disciplinary repositories. And a minor contribution only 2 i.e. 1.80% of the repository is Governmental Type, they are managed by government agencies, these repositories store and disseminate research outputs and data produced by governmental research projects and institutions

Table 3: Repository Management Software Wise Distribution of Open Access Repository:

Software	No. of Repositories	Percentage(%)
DSpace	63	58.33
DSpace-CRIS	2	1.85
Drupal	1	0.93
EPrints	33	30.56
Greenstone	1	0.93
Open Repository	1	0.93
Other	7	6.47
Total	108	100

Table 3 offers the distribution of digital repository software used in India. Of a total of 111 repositories, 108 repositories used software to manage their content, and 3 repositories do not mention any software. According to this table, DSpace is the most popular software used by 58.33% (63 repositories) of the total. EPrints follows with 30.56% (33 repositories), DSpace-CRIS, Drupal, Greenstone, and Open Repository, are used in a partial number of repositories, contributing to a combined total of 4.93% (5 repositories) and Other(OPS, Architexturez, MediaWiki, CSIR Central, Nitya, Metastudio and CALIBRE) represents 6.47% (7 repositories), These tools allow institutions to effectively manage, preserve, and disseminate digital content ensuring long-term preservation of scholarly outputs.

Table 4: Content-Specific Distribution of Repositories in India:

Content-Type	No of Repositories	Percentage (%)
Journal Articles	80	72.07
Theses and Dissertations	63	56.76
Conference and Workshop Papers	55	49.55
Books, Chapters, and Sections	44	39.64
Other Special Item Types	37	33.33
Reports and Working Papers	33	29.73
Learning Objects	25	22.52
Bibliographic References	13	11.71
Patents	6	5.41
Datasets	5	4.51

Table 4 represents the distribution of different types of content of open-access repositories in India. This data reveals that Journal Articles with 72.07% are the most shared content types achieved by 80 repositories. Theses and Dissertations also make up a large portion, present in 56.76% (63 repositories), Conference and Workshop Papers are found in 49.55% (55 repositories), Books, Chapters, and Sections are present in 39.64% (44 repositories), Other Special Item Types contribute to 33.33% (37 repositories), Other content types like reports (29.73%) and learning objects (22.52%) are less widespread while patents (5.41%) and datasets (4.51%) are found in fewer repositories Overall, journal articles and theses and dissertations lead the content landscape, while other types of research outputs like conference papers and books are also well-represented, suggesting a broad scope of scholarly work in Indian digital repositories.

Table 5: Subject Domain-wise Classification of Open Access Repositories in India:

Subject	No of Repository	Percentage (%)
Science	93	83.78
Technology	79	71.17
Social Sciences	70	63.06
Engineering	67	60.36
Health and Medicine	66	59.46
Mathematics	62	55.86
Arts	62	55.86
Humanities	61	54.95

Table 4 highlights the subject-specific distribution of Open Access Repositories in India. Science has the highest no of repositories with 83.78% (93 repositories). Technology comes in second with 71.17% with 79 repositories, Social Sciences (63.06%), Engineering (60.36%), and Health and Medicine (59.46%) are also well-represented. Mathematics (55.86%), Arts (55.86%), and Humanities (54.95%) are with slightly less repositories, but still substantial participation. Overall, the data reveals that Science and Technology are the most dominant subjects, followed by strong representation from various other disciplines.

Table 6: OAI-PMH Analysis:

OAI-PMH Compliant	No. of Repositories	Percentage (%)
OAI-PMH Compliant	69	62.16
OAI-PMH Non-Compliant	42	37.84
Total	111	100

Table 6 signifies the utilization of OAI-PMH URLs for harvesting metadata. The OAI-PMH URL in OpenDOAR is a crucial tool for metadata harvesting, enabling efficient collection and dissemination of repository data. According to the statistics, 69 (62.16%) of the 111 repositories are Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) compliant, whereas 42 (37.84%) are not. This indicates that the common repositories follow OAI-PMH standards, which facilitate the harvesting of metadata and promote greater accessibility to research content.

Major Findings:

1. Table 1 represents the annual growth of repositories from 2005 to 2024. It reveals that 111 repositories were added over the year, with the maximum number of repositories developed in 2013 at 11.71% of the total, while in 2018, no repository was added.
2. From Table 2 the largest share 85.59% (95 repositories) are Institutional Repositories which suggests that most repositories in India are Institutions based.
3. From Table 3, DSpace with 58.33% (63 repositories) is the most used software while other software makes up a smaller fraction for managing the digital repository.
4. Journal Articles with 72.07% and Theses and Dissertation with 56.76% are the most common content type in India from Table 4
5. Table 5 indicates that Science leads with the highest representation of 83.78%.
6. The majority of Repositories follow OAI-PMH standards with 62.16% from Table 6

Conclusions:

Finally, this study concluded that India has made significant contributions to the open access repository landscape, particularly through institutional repositories. The data analysis highlights trends in repository growth, with significant peaks in 2011, 2013, and 2019. Institutional repositories dominate, with DSpace being the most widely used software. Journal articles and theses are the most common types of content archived, with a strong representation across various disciplines, especially in science and technology. A majority of repositories comply with OAI-PMH standards, ensuring greater interoperability and global access to metadata. The findings underscore the growing role of open access repositories in promoting scholarly communication and advancing research accessibility in India and beyond.

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