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Open Access Repositories in the National Knowledge Resource Consortium (NKRC): An Overview of the Indian Academy of Sciences (IAS)

N. R. Shilpa Rani
Assistant Professor, DoS&R in Library and Information Science, Karnataka State Open University, Karnataka, India
E-mail: shilparani.nr@gmail.com
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***Abstract* - Council of Scientific and Industrial Research (CSIR) and Department of Science and Technology (DST) institutions have merged and formed National Knowledge Resource Consortium (NKRC) to share e-resources among its member libraries. Licensed resources have been subscribing to National Knowledge Resource Consortium. However, NKRC has been supporting open access to research content. In this connection, many member institutes in the consortium have set up open access repositories. The CSIR-Central acts as a centralized institutional facility and harvester. The main aim of this present study is to examine the total items deposited year-wise (2011-2020), subject-wise (8 core areas), the total number of downloads that happened during 2010-2021, and the study also highlighted the top five authors browsed by users during 2010-2021.**
***Keywords:* National Knowledge Resource Consortium (NKRC), Indian Academy of Sciences (IAS), Open Access, Institutional Repositories, E-Journals, E-Books, Library Consortia**

I. INTRODUCTION

There are a good number of internationally acclaimed organizations in India that are producing high-quality scholarly research and enhancing the boundaries of knowledge in technological innovation. The success of these institutions will be resulting in a promising research and development activities environment in India that will draw the attention of collaborative research in different areas of study. Modern information and communication technologies are used by these institutions for scholarly information management and dissemination. The open-access revolution influenced the organizations to afford access to their own research, learning, and other related materials to all scholars across the globe. The sharing of knowledge will lead to advanced development in various disciplines. Institutional Repository (IR) platform is playing a vital role in the sharing of knowledge is also called as the digital library. In general, an "institutional repository" can mean a 'warehouse', 'archive', or even 'museum', that collects and organizes the institutions records / artifacts for use and protection falls under the broad definition of the institutional repository. In modern days, an IR is being defined more specifically, but still developing the significance that refers to "the storage and preservation of an organization's digital information or knowledge assets" (IR, 2021).

II. INSTITUTIONAL REPOSITORIES IN INDIA

In a broad spectrum, repositories have been used to collect and store vital information and artifacts for long time use and safekeeping. The history of the libraries illustrates the importance of repositories used to store manuscripts, clay tablets, and other rare information sources. The influence of ICT has brought tremendous change in the role of IRs. These are emerged to provide access to open access scholarly literature. Themain aim of IR's is to make free access to research content on the internet. The information resources of an IR include - Conference papers, Pre-prints of articles, Teaching materials, Doctoral theses and dissertations, Student projects, Datasets, research projects, Computer software, Works of art, Committee papers, Photographs, and video recordings etc. There are a few open-source digital library software's used for IRs like-DSpace, Eprints, fedora and greenstone, etc. Commercial digital repository software's are- Hyperion, Meta Source, Digi Tool, EN Compass, CONTENTdm®, VITAL-VITAL, etc. also being used by many institutions.

In India, there are many institutes that have developed institute repositories to extend scholarly services to their users. Examples of a few institutions are- Indian Institute of Science (IISc), Indian Council of Medical Research (ICMR), Indian Statistical Institute (ISI), Indian Institute of Technology (IITs), laboratories under the Council of scientific and Industrial Research (CSIR), Indian Council Agricultural Research (ICAR), Indian Space Research Organization (ISRO) etc.

III. OPEN ACCESS REPOSITORIES

Open repositories will collect, organize, and provide open access to journal article preprints or reprints, audio/video, digital data, and other media. Open IRs do not offer peer review or editing services, but they may provide access to peer-reviewed and edited documents. Many institutions maintain repositories for the benefit of their own researchers/authors, and it is open to deposits from any researcher/author in a specified subject area. It is pre-condition that, a few funding agencies make it mandate to deposit the articles or data in an open access repository from

the research they fund. A few examples of Open repositories are Directory of Open Access Repositories (OpenDOAR), Repository66.org, Registry of Open Access Repositories (ROAR), arXiv.org, Open Knowledge Repository (World Bank), bioRxiv, Open Science Framework Preprint Repository, PubMedCentral (PMC), Social Science Research Network (SSRN), RePEc (Research Papers in Economics), (OR,2021).

IV.NATIONAL KNOWLEDGE RESOURCE CONSORTIUM-NKRC

The NKRC came into existence in 2009, as a network of libraries and information centers of 26 DST and 43 CSIR institutes. NKRC's origin can be traced when the CSIR has set up the E-Journals Consortium in 2001 to provide access to 1200 odd journals of Elsevier Science to all its users. Over a period, the NKRC is grown in terms of electronic resources and members. Presently, NKRC provides access to 5,000+ electronic journals of all major publishers, standards, patents, citation and bibliographic databases like-ACM, ACS, AIP, ASCE, Annual reviews, ASME, CUP, ASTM, Elsevier, CSIRO, ICE, Emarald, IEEE, IOP, Indianjournals, JCCC, NPG, OSA, OUP, RSC, NOPR, NRC, SciFinder, Sage, Springer, Science/AAAS, Wiley Blackwell, Taylor& Francis, WorldScientific, etc.

Apart from licensed resources, NKRC is also a single point entity that provides access to the huge amount of open access resources to its users. The Consortium visualizes leadership in serving R & D sectors. NISCAIR is managing governance and funding activities. DST and CSIR are funding bodies provide funds for NKRC through NISCAIR. Selected e-resources are negotiated by the coordination committee which includes members from reputed institutes (NKRC, 2021).

V. SCOPE OF THE STUDY

The scope of this study is limited to an open access repository under National Knowledge Resource Consortium (NKRC). It provides an overview of the institutional repository of the Indian Academy of Science, Bengaluru.

VI. OBJECTIVES OF THE STUDY

The objectives of the study are as follows.

1. To examine the year-wise deposit of items to the Indian Academy of Sciences (IAS) Repository.
2. To check the various items deposited to the repository in the year 2011.
3. To observe the various items deposited to the repository in the year 2020.
4. To study the subject - wise deposit to the IAS repository.
5. To assess the download statistics from 2010 to 2021.

VII. INDIAN ACADEMY OF SCIENCES (IAS) REPOSITORY

The Indian Academy of Sciences (IAS) was established as a society in 1934 with the motive to promote the basis of science in the pure and applied areas. As of date IAS has around 1,500+ fellows and it is estimated that all fellows of IAS have published a total number of 100,000 articles so far in various national and international publications. The main aim of the IAS to create the repository to collect, preserve and disseminate publications of the fellows in digital format. It permits the academy members to deposit their scholarly publications, preprints, and postprints, and organizes these publications for easy retrieval. These publications can be accessed by anybody across the globe, but the submission of e-content to this repository is limited to the fellows of the IAS only. EPrints open archive software is being used to deposit and organize publications of the IAS fellows; it meets the terms with the Open Archives Initiative (OAI) framework permitting publications to be easily indexed by indexing services and web search engines.

Key elements of the IAS repository are highlighted as follows.

TABLE I YEAR-WISE DEPOSIT OF ITEMS TO IAS REPOSITORY

Sl. No.	Year of Deposit	Total No. of Items
1	2020	574
2	2019	672
3	2018	713
4	2017	839
5	2016	1590
6	2015	1725
7	2014	1841
8	2013	1891
9	2012	2455
10	2011	3696

Table I depicts the items deposited by fellows of the academy in ten years from 2011 to 2010. Research publications were deposited more during 2011 (3696), followed in the year 2012 (2455). But 2020 (574) and 2019 (672) evidenced a smaller number of items added to the repository.

TABLE II VARIOUS ITEMS DEPOSITED IN THE YEAR OF 2011

Sl. No.	Type of the Item	Total No.
1	Article	3580
2	Book Section	03
3	Conference / workshop item	108
4	Book	02
5	Thesis	01
5	Other	01
Total		3695

A total of 3695 various items are deposited in the repository during 2011. Data in Table II demonstrate the items like- articles, Book Section, Conference / workshop item, Book, Thesis, and others are deposited in the year 2011. Articles (3580) are deposited more compared to other materials.

TABLE III CATEGORY OF ITEMS DEPOSITED IN THE YEAR OF 2020

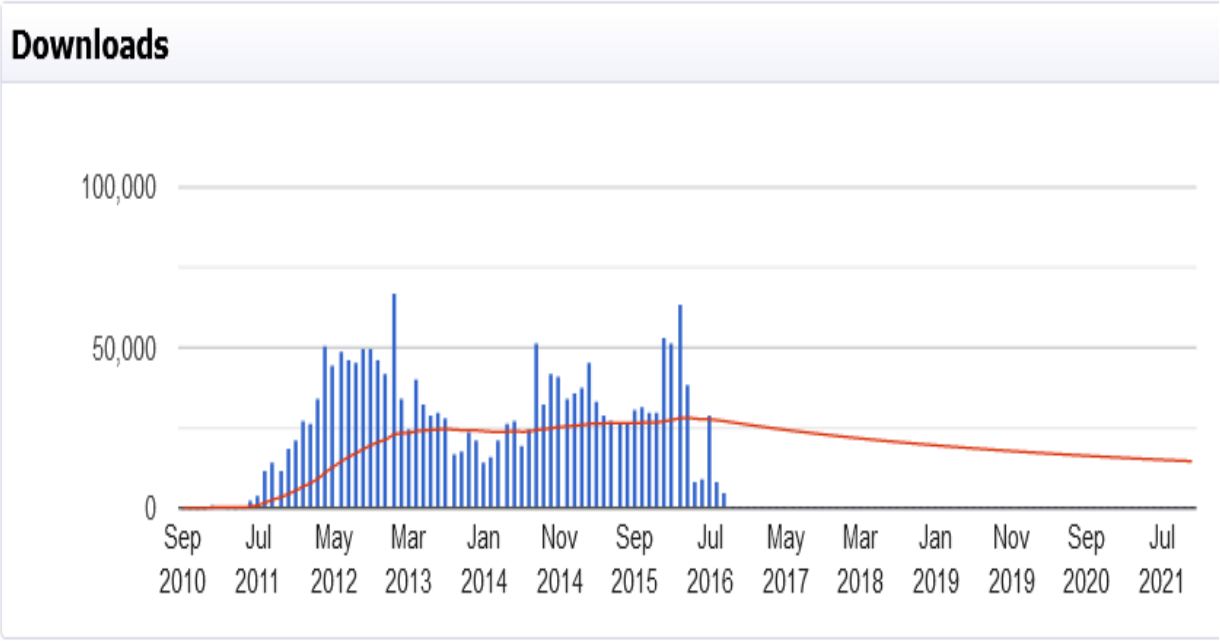
Sl. No.	Type of the Item	Total No.
1	Article	542
2	Book Section	03
3	Conference / workshop item	18
4	Book	01
5	Other	10
Total		574

Table III Illustrates that the total number of different category of items deposited in the year 2020 is 574. A total of 542 articles published in various journals are deposited to the repository. 18 articles of Conference/workshop, 03 book sections, 01 book and 10 other research articles submitted in arXiv.org and to American Physical Society, etc.

TABLE IV DEPOSIT BY SUBJECT-WISE

Sl. No.	Subject	Total No.
1	Animal/Plant Sciences	10756
2	Chemistry	28563
3	Physics	25510
4	General Biology	11540
5	Mathematical Sciences	5392
6	Earth & Planetary Sciences	5978
7	Engineering & Technology	17001
8	Medicine	10046
Total		114782

Table IV highlights a total of 114782 items deposited from core subjects like Animal/Plant Sciences, Chemistry, Physics, General Biology, Mathematical Sciences, Earth & Planetary Sciences, Engineering & Technology, and Medicine. More items were deposited in the area of chemistry (28563) followed by physics (25510).



Source: http://repository.ias.ac.in/cgi/stats/report

Fig.1 Download statistics from 2010-2021

Fig.1 highlights the download statistics of various items during 2010-2021. A total of 1,13,108 various items are deposited and 22,60,005 downloads happened during 2010-2021. In that 20% of the downloads are full text and 20% of the downloads are open access items. Banerjee, Ranajit K (55425), Deb, K. (33763), Khush, Gurdev S. (21571), Pal, Sankar K. (19483), Pradeep, T. (18300) are the top five authors browsed by users.

VIII. FINDINGS OF THE STUDY

1. Research publications were deposited more during 2011 (3696) But the year 2020 (574) evidenced a smaller number of items added to the repository.
2. A total of 3695 items like- articles, Book Section, Conference /workshop item, Book, Thesis, and others are deposited in the year of 2011. Out of which, articles (3580) are more compared to other materials.

3. Data of the total number of the various items (574) like- articles, Book Section, Conference/workshop item, Book, Thesis, and others are deposited in the year of 2020 is examined. Compared to 2011 (3695), the number of items deposited to the repository during 2020 (574) is evidenced in a steep fall.
4. A total of 114782 items were deposited in the core areas like- Animal/Plant Sciences, Chemistry, Physics, General Biology, Mathematical Sciences, Earth & Planetary Sciences, Engineering & Technology, and Medicine. But the chemistry (28563) tops the list out of 8 subjects.
5. A total of 2260005 downloads happened during 2010-2021. In that 20%, full text and 20% open access items are downloaded.

IX. CONCLUSION

Institutional Repositories are gaining momentum in the era of the open access revolution. Users are getting more benefits out of open repositories. The evolution of the e-resources consortium created a thirst to access more e-resources at meagre prices and it resulted in enhancing the research output of institutes and providing additional information resources to academic activities. On the other hand, open repositories pave ways to preserve the scholarly output of the organizations to enable information seekers to find scholarly work easily by indexing and arranging it. In this scenario, NKRC has initiated an open repository service to treat the user community with more scholarly resources. Indian Academy of Science as a member institute of NKRC, made its digital content open to everyone across the world, but it enabled only it's fellows to deposit their research work to its repository. Open access to scholarly scientific research is a revolution; it is accelerating R&D activities in all sectors. The basic motive of the Indian Academy of Sciences is indeed an inspiration to all other research institutions to walk in this way.

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