Designing An Institutional Repository For University Of Agricultural Sciences: Issues Involved

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ABSTRACT-

Many general and discipline specific universities, research institutions and other institutions of higher learning in India are actively developing institutional repositories (IRs) since last two decades. Universities and research institutions of agricultural sciences are no exception to this. The paper traces the repository movement initiated in India with special reference to India in general and agricultural sciences in particular. In the Indian context, much of the discussion centers on the initial or developmental phase of IRs. This article discusses the issues involved in designing the IR for an agriculture university in India using Islandora, as the article is a result of first author's visit to Iowa State University, Parks Library as a Visiting Scholar. The article observes that institutional repositories are becoming prevalent in the Indian academic sector as IR has become a standard feature of the academic library. Concludes that before initiating the process to create an IR at any University, it is essential to address the foundational concerns mentioned previously or the whole initiative would be short-lived and have little impact or value for the investment. And the process needs to be undertaken in a phased manner taking into consideration its user community, nature of research output, financial considerations, and requirements of human resources.

Keywords: Institutional Repository; Universities; University of Agricultural Sciences, Karnataka, India; Designing; Issues

INTRODUCTION

Institutional Repositories(IR) are quite new to the Indian academic world as hardly two decades have passed since the first IR in India–ePrints@IISc---was made available for use at the prestigious Indian Institute of Science, Bengaluru. Since then, many general and discipline specific universities, research institutions and other institutions of higher learning in India are actively developing IRs (Kumar, 2009; Ghosh & Das, 2006).Universities and research institutions of agricultural sciences are no exception to this. The repository movement in agricultural sciences was initiated in India by the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, Telangana, India, (ICRISAT) in 2009 resulting in the first Open Access Repository in Agricultural Sciences in

India - ICRISAT Open Access Repository (http://oar.icrisat.org/). Later in the same year, Indian Agriculture Research Institute (IARI) developed Eprints @I ARI (http://www.iari.res.in). In 2010, OpenAgri (http://agropedia.iitk.ac.in/) was developed by the Indian Institute of Technology Kanpur as part of the National Innovation Project. As an exclusive theses repository for agricultural sciences 'Krishiprabha' was initiated in 2008 under National Agricultural Research System which is now being hosted by Chaudhury Charan Singh Haryana Agricultural University, Hissar. Over the years Institutional Repositories have become part of any institution and there are several issues that need to be addressed before designing an IR. This paper is a result of first author's visit to Iowa State University, Parks Library as a Visiting Scholar to learn from Iowa State's experience in implementing and supporting an IR as a sister-school that also has an agriculture focus.

REVIEW OF LITERATURE

Web of Science, Google Scholar, J-GATE, have been searched and significant articles from 2001 onwards have been reviewed. A review of literature shows that much has been written on different developmental phases of IRs. A systematic review of literature carried out by González-Pérez, Ramírez-Montoya, and García-Peñalvo (2020) show that two of the three User Centric Design phases—evaluation and requirements—are closely linked and are the reiterative focus of User Centric Design. Hence authors claim that it is required to promote design of custom-made prototypes according to the users' motivations. Priyadarshini (2019) has traced the growth and development of IRs by dividing it into two phases: the first one from 2002 to 2009 indicating the initial phase of IR development and the second phase from 2010 to 2017 which

consists of mainly adding value-based services for the user community.

Literature related on the initial phase outlines the process of developing necessary infrastructure, defining the policies and procedures, and building out basic services, etc. The second phase is characterized by the addition of more dynamic scholarly publishing, self-archiving, and other value-added services, as well as ranking of IRs and content management systems, and usability assessment. Asadi and others (2019) focused their study on "deployment, implementation and adoption" of IRs, they also discovered that IRs receive considerable attention from researchers across disciplines and around the globe. Bashir, et. al. (2021) complimented this discovery by highlighting the evolution and conceptual framework of IRs that have positive impact on academic scholarship through the heightened visibility of the research, the scholars' wider reach to different audiences, and earlier communication of timely research.

Lin, et al (2020) have collaboratively developed a set of guiding principles to demonstrate digital repository trustworthiness – Transparency, Responsibility, User focus, Sustainability, and Technology. Nneka, and Kaosisochukwu (2021) notes that IR shall preserve traditional scholarly material by empowering faculties to contribute their research articles and e-books. Idiedo, et al (2024) based on the study of Nigerian Universities observe that University Librarians, university management and policy makers need to provide the necessary infrastructure and formulate policies for smooth development of institutional repositories to make research visible globally.

In the Indian context, much of the discussion centered on the initial or developmental phase of IRs as described by Priyadarshini (2019).

Ghosh and Das (2006) reported that many initiatives made to develop IRs in India were carried out to encourage academic institutions engagement in the Open Access movement. Of the 20 IRs surveyed, all were in different developmental stages. Two were initiatives from universities while the other IRs belong to different categories of institutions like Indian Institute of Technologies, Indian Institute of Managements, R & D libraries and libraries of institutions of national repute. Majority of these IRs were developed using DSpace. Lihitkar, et. al. (2013) conducted a survey of 33 then existing and active IRs in India and found that most of the IRs in India developed their IRs using either DSpace or GNU Prints and they did not create and adopt necessary governance and management structures, thus made little progress making the content openly accessible. Lihitkar, et. al (2013) also observed that there was no perceived growth in the number of documents added to these repositories since the IRs' creation. Kumar (2009) noticed that 58% of research & development institutes, 29% of academic institutions, and 13% of corporate entities in India had operational IRs and were rapidly growing with the help of open source softwares like DSpace, GNU E-Prints, and GSDL.

Krishnamurthy and Kemparaju's (2011) study of IRs in the Indian universities and research institutes showed that the growth (in terms of number) of IRs in the universities of India has not met expectations nor has the development of services necessary to support functional IRs. While the reputed institutions and universities were quick to develop IRs, other institutions of higher learning and state universities have yet to initiate the process of creating and developing IRs.

Tripathi & Jeevan (2011) observed that IR initiatives require institutional policies and support from authorities to be viable long-term.

Kalbande (2012) noted "Indian initiatives have proved that there are no major barriers to initiate an IR at locations of higher learning, however the growth and development of IRs is quite low compared to other developed countries (Roy; Mukhopadhyay & Biswas, 2012)".

In 2011, Sawant examined 16 Indian IRs and found that few were either registered under ROAR (Registry of Open Access Repositories) or Open DOAR (Directory of Open Access Repositories). Sawant also found that the procedures and guidelines that were created internally at the institutions were neither systematic nor standardized in their application, and suffer from certain technical limitations of the platforms. Vyas's (2013) study of open DOAR found that of the 2233 IRs, 54 were of Indian origin accounting for only 2.42% which indicates low representation of Indian IRs on a global scale hampered by the non-systematic guidelines and technical limitations.

Even with these hurdles, Singh's (2016) study of IRs in India showed that there was a growing trend to develop open access IRs among institutions of higher learning. In 2020, Kuri and Singh found that of the 5414 IRs indexed in the DOAR, 96 were from India and were functioning on DSpace and Eprints repositories indicating a dramatic increase in the number of repositories globally and the continued increase in the number of Indian IRs.

Dhanavandan and Tamizchelvan (2014) found that India accounted for 82.6% of the total IRs listed among the south Asian countries and DSpace was the most popular software platform for serving the content digitally. Gul, et. al. (2019) also observed that India tops the list of operational IRs in the South Asia region. These IRs mainly consist of doctoral theses, conference papers and research publications of the institution (Kaur, 2013), OAI-PMH (Open

Archive Initiative-Protocol for Metadata Harvesting) remains the most popular base URL, and DSpace the software of choice. They also have noticed that Indian IRs largely have not defined their content management policies and have not customized their technology stack and interfaces in accordance with local practice. Panda and Noble (2021) reported the status of Indian Open Access Institutional Repositories (OAIRs) housed in Open DOAR and found that DSpace remains the most prominent software and further signified the continual growth of IRs that has been observed during the Corona virus pandemic.

Unlike the reports on the development of IRs, not much has been reported on the building of IRs specific to the field of Agricultural sciences in India. In fact, Roy et al. (2016) noted that there were very few IRs relating or dedicated to agriculture sciences. Of the 138 agricultural sciences IRs, only five originate in India, and all of them were still in the developmental stage. As such an effort is made in this article to discuss the issues involved in designing the IR for an agriculture university in India.

University Of Agricultural Sciences

University of Agricultural Sciences were established to support teaching-learning, research and support extension programs in Agricultural and allied sciences to cater to the needs of a defined geographical proximity. These institutions require the recognition of Indian Council for Agriculture Research (ICAR), New Delhi, University Grants Commission (UGC), New Delhi and All India Council for Technical Education (AICTE), New Delhi to offer various courses. Normally each university will have its own post graduate departments and also colleges to impart education and research at different levels. Besides this every university will also have research stations, extension education units, Krishi Vigyan Kendras, and All India

Coordinated Research Project (AICRP) schemes as well as the Agricultural Technology Information Center (ATIC).

At present the University of Agricultural Sciences have their own repository of theses and dissertations a mandatory requirement for ICAR Krishikosha. Since the University of Agricultural Sciences, are engaged in interdisciplinary, multifaceted, and intentionally public work it is imperative on part of the University to develop a publicly accessible portal, or an IR for research outcomes in line with the mission and priority of the university. Hence there is a daunting task of ensuring that the developed Institutional repository acts as a catalyst for higher research visibility. This calls for addressing the following critical issues that may hamper the very objective of an IR.

Content

The faculty and research scholars of any UAS publish their research results in scientific periodicals (from low impact factor to high impact factor journals), proceedings of conferences/seminars, and monographs. Additional research outputs include sources like theses/dissertations, research reports, technical reports, and grey literature (pamphlets, posters, handbooks, manuals, etc.) in both the print and digital media. The UAS IR could be developed as an open access, full-text digital repository that provides access to wide range that is all encompassing of the research outputs mentioned above in addition to images and audio-video files, artefacts, and rare or unique UAS materials that are not considered "published" research products. As such there exists a huge amount of literature that can be made available through the proposed IR.

Grey literature, which exists solely with the faculty, can be considered a first priority as there are no copyright issues to deal with and

can be considered the lowest barrier to entry in developing an IR. Over time, the other content could be included in the IR. Though identification and collection of grey literature will be a gigantic task, the IR building process can be initiated as a proof of concept to prove that an IR will play a vital role in preserving the Institutions unpublished literature. Further prioritization would be based on a need-based analysis and the financial burden associated with inclusion.

Ir For The University

Developing an IR is not a simple and one-time task. It is a complex process. Like any complex process it can be logically sequenced into series of smaller tasks. As noted, IRs at universities were largely initiated by library and information sciences professionals and while a librarian is likely to undertake management of the project it requires support from different groups of people – people from technical services, public services and administration (Barton & Waters, 2004). Before developing the IR, it is essential to know what is encompassed within the local concept of an "IR". Having the grounding of a definition allows one to better scope the development of an IR by the university.

Of all the definitions, a two-decade old definition offered by Lynch (2003) still resonates. He defines an IR as a "set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long term preservation where appropriate as well as organization and access or distribution". Given examples such as the one offered by Naikwadi, Shinde & Ingale (2010) which described the planning process of building IR, it is evident that the development

of an IR is a complex initiative that involves a large stakeholder group and requires support from technical services, public services and strong administrative support. The process of development requires time and effort committed towards "building advocacy, garnering collections, and determining policies (Gibbons, 2004)".

- Developing an IR involves many components like policy formulation, platform selection, hardware identification, choosing content, getting technological and marketing support, etc. Still, the process of developing an IR can be generalized to three distinct stages – pre-implementation, implementation and post implementation. The following issues identified by Henty (2007) need to be addressed carefully before starting the IR project:

- Defining the roles and responsibilities of staff involved in developing IR;

- Making the service sustainable;

- Demonstrating the value of IR to the user community;

- Guaranteeing quality of service;

- Defining the collection;

- Meeting requirements for the retention of data as specified by funding agencies and providing access to published research outputs;

- Institutional preparedness for the maintenance of research data;

- Mapping the skills required and prepping qualified staff with requisite skills;

- Selecting an appropriate software platform and ensuring a robust and reliable technological environment;

- Deciding on copyright and other legal and regulatory aspects of maintaining a repository service including digital rights management; and addressing digital preservation issues.

Financial Resources

The National Educational Policy-2020 released by the Government of India makes it mandatory to integrate higher education with technology and it demands the institutions of higher education to provide access to networked information and also provide access to published research output through open access. The policy to promote this culture has provisions to support institutions developing IRs. The UAS must explore possibilities of alternate financial resources, including various funding agencies as suggested in the policy, to build an IR, as developing IRs do require financial support from the parent organizations for recurring and non-recurring expenditures. Campbell-Meier (2008) aptly asks why libraries choose to undertake IR development without first procuring additional funding from the institution. Very little is known about the financial expenditures academic libraries must make building and managing IRs. Bailey (2006) estimated almost one and half decades ago that the reported start-up costs for IR implementation range from $8,000 to $1,800,000 with ongoing operational budgets running between $8,600 and $113,543 for ARL libraries. Three years later Giesecke (2011) estimated that an institution requires an amount ranging from $130,000 to $248,000.

In the Indian context this accounts for INR 634800 to INR 142830000 as initial cost. The maintenance costs range from INR 682410 to INR 9009637. The biggest question is how to mobilize financial resources of such a magnitude. Given the annual budget, it is clear that currently no fund is allocated to support the development or ongoing support needed for a new IR.

However, the IR development should not be stopped because of current funding issues. The work could be undertaken in a phased manner with resources pulled from different sources and added to over time. Additionally, certain services like Mediated submission for consistent metadata Statistics for authors related to download counts and 'repository author profiles'; maintaining participating faculty scholar alerts and updating content based on Google Scholar alerts; faculty/staff CV reviews to update repository with new scholarly content; facilitated deposit of research center materials and the maintenance of organization research profiles; embargoes for select materials; facilitating path to completion for students in the deposit of their open research, thesis and dissertations; minting DOIs; maintenance and feature negotiation with repository vendor; and the digitization of historical records could be designed as fee-based so that certain expenditures could be met using cost-recovery methods.

Burns, et. al. (2013) observed that "institutions that mediate submissions incur less expense than institutions that allow self-archiving, institutions that offer additional services incur greater annual operating costs than those who do not, and institutions that use open-source applications have lower implementation costs with institutions that use proprietary solutions". It is further suggested the regular budget absorbed these costs as a reoccurring or expected expenditure rather than treating it as a special initiative.

Holley (2004) with her own experience at the University of Aukland library says 'feel the fear and do it anyway' proposed a pragmatic framework comprising of eight elements – creating inventory of digitization projects,

raising awareness, training and re-skilling of staff, developing networks, collaborations, and relationships for various activities, obtaining funding support, instigating the digitization projects, enhancing the IT infrastructure, making strategic planning and producing policy document. The framework, she postulates could be used by institutions with similar size, research programs, funding agency mandates, and aspirations in disseminating scholarly output. UAS of similar size, operates under similar funding mandates and aspires to disseminate scholarly output broadly in accordance with the university's strategic mission.

The Platform To Be Adopted

Platform selection is an experience that everyone considering an IR will encounter. The platform is not a panacea but one important component of the IR service. The creation of an IR typically represents a long-term commitment with significant impacts for the community. The platform, therefore, should be selected in such a way that considers the ultimate goals of the repository service and must be usable and functional for said community in order to achieve those goals. From the published literature it is evident that many open and hosted platforms exist and are being used by a large number of institutes across the globe.

In the Indian context, Dspace, E-prints, GSDL are the most popular software used to create IRs. Bankier and Gleason (2014) identified twelve categories for evaluation of platforms which are important to building successful IR programs. These include infrastructure, front end design, content organization and control, content discovery, publication tools, reporting, multimedia facilitation, social features & notifications, interoperability, authentication, accessibility and preservation. By evaluating Dspace, EPrints, Digital Commons, Fedora and Islandora they conclude that the "products have

richer feature sets and all these platforms are available as a hosted service which arguably has a lower total cost of ownership and is less time consuming than running an IR locally".

Pyrounakis, Nikolaidou and Hatzopoulos (2014) did not identify a single-best platform between DSpace, Fedora Commons, Greenstone, Eprints and Invenio-each have advantages and disadvantages. Each software is best suited to deal with specific user needs and digital content. Rather than identifying the one platform that works best for all IRs, they propose that the platform be decided on the most suitable system for different use cases and digital collections. One must consider the nature of the proposed content to be included, the level of complexity the software supports and the customization necessary to deploy a fully featured, distributed digital repository within one's local context.

As a visiting scholoar to Parks Library, the first author was exposed to several different respository platformsand was able to experience first-hand the use of the various platforms and their management. The evaluative period helped the first author determine that Islandora satisfies as many workflows as possible in a single ecosystem. An ecosystem designed to ease the management of security and workflow for digital assessts. Overall, it is felt Islandora integrates a number of robust open source software project. Additional softwarecan be integrated to an Islandora site through various methods.

Pyrounakis, Nikolaidou and Hatzopoulos (2014) suggest Fedora Common for building a repository with appropriate levels of flexibility and complexity. Fedora also benefits from other integrations with software like Islandora, which is based on Fedora, Drupal and a host of other applications released under GNU General Public License. This will be useful in the

context of UASD and other repository needs of India's institutions of higher education.

Islandora is a free and open-source digital repository system and provides a robust and fully featured repository solution. Islandora emerged out of the need for tools that facilitate collaboration and community in the digital age. It is committed to open standards for information sharing and transforming. It is quite flexible to modify and extend to suit institutions data and workflow. Islandora open-source community helps institutions and their audiences collaboratively manage and discover digital assets using a best practices framework (Anez, 2015).

Islandora provides a wide range of functionality, from ingest to storage to management and presentation, which are particularly useful for UAS. Islandora offers a number of digital preservation features that add value to its storage and management functions in particular. It is also quite amenable with Solr to provide ease in searching for the end-user. It is capable of creating and handling very large searchable collections of digital assets of any type. It is content agnostic and uses micro-services which help in automating transformation of assets easily. It stores data assets securely. The platform supports any XML metadata standard and extends support for semantic ontologies. The software offers digital preservation features and readily exposes data for harvesters. It is quite flexible in the sense that migration and batch editing can be done easily reducing the amount of administrative labour for the library. The current release of Islandora8 (Available at: github.com) provides necessary tools which modifies Drupal 8 instance into a fully functional preservation repository for digital asset management. Being an open source software framework Islandora is suited to

knowledge sharing and long term data stewartship and preservation.

In taking the numerated considerations stated above and first author's experience at Parks Library, Iowa State University in Ames, Iowa – Islandora would be an appropriate platform to build an IR for UAS.

User Imperative

The UAS caters to the higher education and research needs of the field of Agriculture and allied sciences along with furthering the extension activities to farming communities. Although their academic and research needs are catered to by the library system there is a gap in providing *access* to all the published and unpublished literature of the research and extension community. The IR would address the imperative to compliment traditional purchased library collections (textbooks, journals, magazines, newspapers, thesis and dissertations, reference sources, e-resources like e-journals; e-books, ETDs, reports, patents, etc.) with timely, evolving, cutting-age research outcomes from the research university.

Other Issues

There are other issues that require due consideration before implementing an IR. Specifically issues of IR policy development, copyright, licensing and legal issues, hardware issues, metadata and local ontology's, developing staff with skills to operate IRs, installation of software, interface designing, developing depositing and archiving policies, registering with Open Access Repositories, promoting and advocating strategies, and quality control.

CONCLUSIONS

Institutional Repositories were first developed as online solutions for collecting, preserving and disseminating institution's scholarship. Later, they became platforms for libraries to

publish and showcase the full scope of scholarship of an institution. The emergence of open source software made the development of IR's more viable in the Indian context. While the trend of establishing IRs occurred over the last decade, their critical importance was made more visible during the COVID -19 pandemic. Institutional Repositories are becoming prevalent in the Indian academic sector as the IR has become a standard feature of the academic library. In addition to the noble goals of providing greater access to research at an institution, the library IRs are critical for the effective functioning of the institution of higher learning and a major parameter for accreditation by the accrediting and performance assessment agencies like NAAC (National Accreditation and Academic Council), NBA (National Board of Accreditation) and ICAR (Indian Council of Academic Research).

Further, the IR enhances the visibility of any institution to show case its research output. While IRs are quite new to the Indian academic world, LIS professionals, researcher and their community are quite enthusiastic in their support to build one. Before initiating the process to create an IR at UAS, it is essential to address the foundational concerns mentioned previously or the whole initiative would be short-lived and have little impact or value for the investment. The University of Agricultural Sciences, which is catering to the needs of researchers, farmers, extension workers and academicians in the field of Agriculture and allied subjects, must have its own IR to showcase its research output and also help the region to exploit the resources – the community knowledge to the optimum extent for betterment of agricultural practices. The process needs to be undertaken in a phased manner taking into consideration its user community, nature of research output, financial

considerations, and requirements of human resources. A phased approach has been started by information professionals at UAS, beginning with conceiving the idea of developing an IR and the author's evaluation and research produced and represented in this paper.

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REFERENCES

1. Anez, Melissa modified by Pinto James. About Islandora, 2015. *https://wiki.lyrasis.org/display/ISLANDORA715/About+Islandora Accessed on 20 July 2022*

2. Asadi, S.; Abdullah, R.; Yah, Y. & Nazir, S. Understanding institutional repository in higher learning institutions: A systematic literature review and directions for future research, IEEE Access, 2019, 7, Available at: *DOIhttps://doi.org/10.1109/ACCESS.2019.2897729*Accessed on 9 March 2022

3. Bailey, C.W. Institutional Repositories: SPEC Kit 292. Washington, DC: Association of Research Libraries, 2006

4. Bankier, Jean Gabriel & Gleason, Kenneth. Institutional software comparison. DigitalCommons@University of Nebraska – Lincoln, 2014.Available at: *https://digitalcommons.unl.edu/scholcom/13* Accessed on: 19 February 2022

5. Barton, Mary R & Waters, Margaret M. Creating an institutional repository. LEADIRS workbook, Cambridge: MIT Libraries, 2004. Available at:

https://dspace.mit.edu/handle/1721.1/26698
, Accessed on 2 February 2022

6. Bashir, S., (et.al.). Evolution of institutional repositories: Managing institutional research output to remove the gap of academic elitism. Journal of Librarianship and Information Science.2021

7. Burns, C Sean; Lana, Amy & Budd, John M. Institutional repositories: Exploration of costs and value, D-Lib Magazine, 2013, 19 (1/2) Available at: *https://www.dlib.org/dlib/january13/burns/01burns.html* Accessed on 21 March 2022

8. Campbell – Meier, Jennifer. Case studies on institutional repository development: Creating narratives for project management and assessment, 2008. (Ph D Thesis: University of Hawai)

9. Dhanavandan, S &Tamizchelvan, M. A study on recent trends and growth of institutional repositories in South Asian countries. International Journal of Library & Society, 2014, 3(1) Available at: *http://www.publishingindia.com/GetBrochure.aspx?query=UERGQnJvY2h1cmVzfC8xOTgzLnBkZnwvMTk4My5wZGY* Accessed on 9 March 2022

10. Ghosh, S B & Das, A K. Open access and institutional repositories- a developing country perspective: A case study of India World Library and Information Congress: 72nd IFLA General Conference and Council20-24 August 2006, Seoul, Korea Available at *:http://www.ifla.org/IV/ifla72/index.htm* Accessed on 18 February 2022

11. Gibbons, S. Establishing an institutional repository, Library Technology Reports, 2004, 40(4).

12. Giesecke, Joan. Institutional repositories: keys to success, Digital Commons@University of Nebraska-Lincon, 2011, 11 Available at: *https://digitalcommons.unl.edu/libraryscience/255* Accessed on 24 March 2022

13. González-Pérez, Laura Icela; Ramírez-Montoya, María-Soledad and García-Peñalvo, Francisco J. (2020) User Experience in Institutional Repositories: A Systematic Literature Review, IN: Digital Libraries and Institutional Repositories: Breakthroughs in Research and Practice, *DOI: 10.4018/978-1-7998-2463-3.ch026*

14. Gul, Sumeer; Bashir, Shazia&Ganaie, S A. Evaluation of institutional repositories of South Asia, 2019, Online information Review Available at: *https://www.emerald.com/insight/content/doi/10.1108/OIR-03-2019-0087/full/html* Accessed on 9 March 2022

15. Henty, Maragaret. Ten major issues in providing a repository service in Australian universities. D-Lib Magazine, 2007, 13(5/6) Available at: *https://www.dlib.org/dlib/may07/henty/05henty.html*Accessed on 14 July 2022

16. Holley, R. Developing a digitization framework for your organization. The Electronic Library, 2004, 22(6), 518-522. DOI:https://doi.org10.1108/02640470410570820 Accessed on 12 February 2022

17. Idiedo, V O et al (2024). A Survey of Open Access Institutional Repositories in Nigerian University Libraries: The Current State, International Journal of Knowledge Content Development & Technology 14(1), 53-73

18. Kalbande, Dattatreya. Institutional repositories in India: A overview. Online International Interdisciplinary Research Journal, 2012, 2(4), 194-203

19. Kaur, Managing institutional repositories in India: Benefits and Challenges, International Journal of Management and Applied Science, 2017, 3(10), 85-88

20. Krishnamurthy, M. &Kemparaju, T. D. Institutional repositories in Indian universities and research institutes: A study. Program: Electronic Library and Information Systems, 2011, 45 (2), 185-

198.DOI *https://doi.org/10.1108/0033033111112972 3* Accessed on 14 July 2022

21. Kumar, Ashok N. Institutional Repositories in India, In: National Seminar on Strategic Information Management in the Digital Era, Tamil Nadu (India), 26-27 March 2009.

22. Kuri, Ramesh & Singh, Madan. Indian Institutional Repositories (IRs) reflected in the Directory of Open Access Repository (DOAR): A case study, Library Philosophy and Practice (e-journal), 2020. Available at: *https://digitalcommons.unl.edu/libphilprac/ 4640* Accessed on 18 February 2022

23. Lihitkar, Shalini R.; Lihitkar, R. S. & Agashe, A. T. A study of major institutional repositories in India, IN: 12th International Conference on Electronic Theses and Dissertations, Pittsburgh, PA, 2009

24. Lin, Dawei and et al. (2020). The TRUST Principles for digital repositorie, Scientific Data 7, 144 Available at: *https://www.nature.com/articles/s41597- 020-0486-7*

25. Lynch, Clifford. Institutional repositories: Essential infrastructure for scholarship in the digital age. ARL Bimonthly Report No.2. 26 Feb. 2003 Available at: *http://www.arl.org/resources/pubs/br/br226 ir.shtml* Accessed on 18 February 2022

26. Naikwadi, Vitthal; Shinde, Pradeep &Ingale, R. N. Creation of an institutional repository of Mahtma Phule Krishi Vidyapeth, Rahuri, 2010. Available at:*https://www.researchgate.net/publication /339528977_Creation_of_an_%27Institutio nal_Repository%27_of_Mahatma_Phule_K rishi_Vidyapeeth_Rahuri* Accessed on 19 January 2022

27. Nneka, Chibueze Maureen and Kaosisochukwu, Chukwu (2021). Journal of ICT Development, Applications and Research, 3(1/2), 41 – 49, DOI *10.47524/jictdar.v3i1.42*

28. Panda, Subhajit & Noble. Current status of Indian Open access institutional repositories (OAIRs) and its significance in pandemic era. In Proceedings of the 8th International Conference on Libraries, Information and Society 2021 (ICoLIS 2021) (1-23). Kuala Lumpur, Malaysia: Department of Library and Information Science Faculty of Arts and Social Sciences, Universiti Malaya and Universiti Malaya Library. *https://doi.org/10.5281* Accessed on 19 January 2022

29. Priyadarshini, Abhilasha. Growth and development of Institutional repository: A literature review, Library Philosophy and Practice (e-journal), 2019. Available at: *https://digitalcommons.unl.edu/libphilprac/ 2453*Accessed on 2 February 2022

30. Pyrounakis, George; Nikolaidou, Mara & Hatzopoulos, Michael. Building digital collections using Open Source Digital Repository Software: A comparative study. International Journal of Digital Library Systems, 2014. DOI: *https://doi.org/10.4018/ijdls.2014010102Ac* cessed on 20 July 2022

31. Roy, B K.; Biswas, S. C. & Mukhopadhyay, P.Agri Cat: An one-stop shop for OAI based open access agricultural repositories, Journal of Agricultural Informatics, 2016, 7(1), 107-118

32. Roy, B K.; Mukhopadhyay, P & Biswas, S. C. An analytical study of Institutional digital repositories in India, Library Philosophy and Practice (e-journal), 2012. Available at: *http://digitalcommons.unl.edu/libphilprac/6 92*Accessed on 12 March 2022

33. Sawant, Sarika. Institutional repositories in India: A preliminary study, Library Hi-tech News, 2011, 10, 6-10. DOI *https://doi.org/10.1108/0741905111120264 6* Accessed on 12 March 2022

34. Singh, Prerna. Open access repositories in India: Characteristics and future potentials.

IFLA Journal, 2016. Available at *https://doi.org/10.1177%2F0340035215610 131*Accessed on 7 March 2022

35. Tripathi, M. & Jeevan, V. K. J. An evaluation of digital libraries and institutional repositories in India. The Journal of Academic Librarianship, 2011, 37(6), 543–545

36. University of Agricultural Sciences, Dharwad Available at: *https://dspace.mit.edu/handle/1721.1/26698* , Accessed on 30 March 2022

37. Vyas, Jagdish R. Study of Indian Repositories on DOAR, International Research: Journal of Library & Information Science, 2013, 3(2), 324-339