



Developing a Federated Institutional Repositories in Nigerian University Libraries

Jibril Attahiru Alhassan, CLN 
Federal University of Technology, Minna-Nigeria

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Abstract

Information and Communication Technology has enabled the digitisation of hitherto hard copy information resources which can be made available to information users in digital format. Libraries in tertiary institutions, particularly university libraries, have therefore leveraged on this to deposit the intellectual output of their universities in repositories and make it open so that they can be visible worldwide. This paper discussed the concept of open institutional repositories and requirements for setting up an institutional repository, benefits of a federated repositories and management practices of librarians to ensure effective use of the repositories. The study used the quantitative research method and made use of questionnaire in the collection of relevant data. Existing literature was reviewed and a quantitative data analysis approach was employed. The findings revealed that majority of the respondents (94.10%) stated that they have institutional repositories in their universities; contents in institutional repositories were open (70.6%) and a high percentage of 70.6% of the respondents stated that they have operational institutional repository policies. It was revealed that the repositories contained more journals than the other contents with 70.60% followed by research data with 64.70% and only a little above half (52.9%) of the repositories were registered on the OAI-PMH. Strategies for effective repositories management practices were predominantly dependent on training and retraining of staff and contents of IRs were made open. The major perceived challenges facing the federated IR in Nigeria include poor ICT infrastructure (76.5%) and poor Internet connectivity (76.5%). The study recommended adoption of the institutional repository, specifically, federated institutional repository in Nigeria by university libraries to effectively manage information resources created within the institutions.

Keywords: Institutional Repository, Nigerian University Libraries, Federated Institutional Repositories, Repositories Management Practices

Introduction

Universities in Nigeria have started to heed the call made by the National Universities Commission in 2007, which encouraged academic libraries to provide access to both print and electronic resources, especially those generated within the universities in order to increase access to information resources and visibility of their institutions as a measure of prestige and recognition internationally. This is because the idea of an institutional repository is a current theme in tertiary institutions that have seen the necessity of making

available their institutional resources online, thereby increasing their visibility and better performance in the ongoing web ranking of world universities in particular (Anenene et al., 2017).

Universities as academic institutions of higher learning place emphasis on research activity as one of their core functions apart from teaching, learning and community services. One of the key criteria used to measure the quality of any university is the quality and quantity of research outputs. Any university that failed in the production of quality research which

can be applied in moving the society forward both socio-economically and technologically, has lost its relevance and reputation. It is therefore indispensable that in increasing the frontiers of knowledge and imparting the society positively, adequate attention should be placed on the intellectual output emanating from the researchers. The situation where the totality of the research output emanating from a particular university cannot be determined will make it very difficult to evaluate the university output and could also hinder the collation and onward transmission of the researches that may benefit different segments of the society to the parties concerned. This brings up the need for the establishment of federated institutional repositories (FIRs) in university libraries in Nigeria.

Statement of the Research Problem

Despite the necessity of institutional repositories (IRs) and the potential benefits associated with the use of federating institutional repositories by universities, the researcher had observed that most university libraries in Nigeria have not keyed in into this laudable innovation. This could be as a result of some factors such as, poor perception of IRs and the benefits of federating institutional repositories, restrictions of contents in institutional repositories, lack of operational institutional repository policies, inadequate contents for institutional repositories and lack of registration with the relevant body. It is based on this, that this study considers the situation of institutional repositories in university libraries in Nigerian.

Purpose of the Study

The research aimed at investigating the institutional repositories and open science in university libraries in Nigeria, West Africa. The following specific objectives guided this study:

1. determine the number of university libraries with institutional repositories and federating institutional repositories;
2. examine the availability of contents in institutional repositories in university libraries in Nigeria;
3. determine the extent of visibility of contents and operational policies of institutional repositories in university libraries in Nigeria;
4. identify the challenges in institutional repositories as well as the federated institutional repositories management by university libraries in Nigeria;

5. determine the possible strategies to the challenges encountered in institutional repositories as well as the federated institutional repositories management by university libraries in Nigeria.

Research Questions

The under listed research questions guided the study.

1. How many university libraries have institutional repositories in Nigeria and federated institutional repositories?
2. What contents are available in the institutional repositories of university libraries in Nigeria?
3. How visible are the contents and of the institutional repositories in university libraries in Nigeria?
4. What operational policies are in place for developing institutional repositories in university libraries in Nigeria?
5. What are the challenges encountered regarding the management of institutional repositories by university libraries in Nigeria?
6. What are the possible strategies to the challenges encountered in institutional repositories management by university libraries in Nigeria?

Literature Review

ICT has enabled the digitisation of hitherto hard copy information resources which can be made available to information users in digital format. Libraries in tertiary institutions, particularly university libraries, have therefore leveraged on this to deposit the intellectual output of their universities in repositories and make them open so that they are visible worldwide. Since they are opened for access, they are called Open Institutional Repositories and house the educational resources required for teaching, learning, and research. This is in tandem with the open science initiative (Tzanova, 2020).

Institutional Repository (IR) has been defined and explained by various authors with all focusing on the digital academic contents of an institution. According to Crow (2002) it is an archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. Lynch (2003) defined institutional repository as "a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members. He explained that such materials include monographs, preprints

and post-prints of academic journal articles including those undergoing peer review, Electronic Theses and Dissertations (ETDs), OERs, Datasets, Conference Proceedings and many more.

The aim(s) of establishing institutional repositories according to Esse and Haliso (2023) are to protect and preserve research outputs created by the university members and to make the research outputs available for people who might need them at any point in time. They stated further that “the development of open access institutional repositories requires fast and dependable internet connection cum deployment of necessary information and communication technology infrastructure”

Ukwoma and Dike (2017) affirmed that academics also utilize their IRs for archiving published works to increase their visibility and collaboration with other academics. Collaborating this, Sucheth (2021) submits four major benefits of having an Institutional repository to include collation of research output of institutions fragmented across various Departments and disciplines; increase in the visibility of the Institution; building intellectual leadership and credibility; and preservation of scholarly work.

The University of Alabama Libraries (n.d.) also provided some benefits when it stated that The University of Alabama’s IR will benefit contributing faculty, staff, and students with:

- Wider distribution of research and scholarship throughout the world.
- More citations and attributions.
- Usage statistics on downloads.
- Compliance with funder mandated open access.
- University imprimatur - single place to showcase intellectual output of the University.
- Community & author control.
- Digital preservation of materials

An Institutional Repository (IR) is an archive for collecting, preserving and disseminating digital copies of the intellectual output of an institution (university). IR is necessary in archiving published works to increase visibility of the researcher and his university; and increase collaboration with other academics. Contents of an open IR include materials such as: monographs, e-prints of published journal articles, Electronic Theses and Dissertations (ETDs), datasets, course notes, learning objects, academic posters, technical reports and conference proceedings (Clements et al., 2015).

Certain factors can pose challenges to the

deployment of Institutional Repositories to many university libraries in developing countries like Nigeria. According to Esse and Haliso (2023) one of the challenges of IR sustainability in Nigeria and many other developing countries is that of Information and Communication Technologies and Internet connection. They further cited Christian (2009, as cited in Esse & Haliso, 2023) who in his study discovered that institutional repository development has been challenged by various problems which includes epileptic power supply, lack of ICT skills, poor funding and so on. Electricity supply is a major problem associated with IRs in developing countries like Nigeria. However, Safdar (2021) viewed the challenges from angle of accessibility and opined that most of these outputs produced by universities are not effectively accessed and shared by researchers and other stakeholders.

Setting up an Institutional Repository

Sucheth (2021a) provided the following steps in setting up an Institutional Repository:

i. Create a policy for your repository; lay down rules and guidelines to avert confusion. Set rules for the type of content and its format, formatting guidelines for each contributor, access levels, rules for withdrawing publication and funding.

ii. Select the right IR platform for your needs capable of hosting, managing and showcasing your scholarly capital.

iii. Acquire the correct IT infrastructure as a major step in setting up an IR. Keep in mind the computers capable of handling IR, servers which can host them without any hiccups; software to run it efficiently and smoothly and staff to manage the infrastructure.

iv. Populate the IR as an important step to ensure its sustainability. Measures must be in place either through policies (staff uploading their publications for promotion) or external partnerships with third party publishers to allow for harvesting of the metadata of the institution’s staff publications or content exchange.

Building a repository is a tip of the iceberg. Keeping it updated and running is another ball game. It is important to make sure that the repository is updated regularly; usage and access metrics should also be checked frequently.

Federated Institutional Repositories

No single institutional library has all the information or learning resources needed by its

patrons, it is therefore imperative to bring together what is available in sister libraries to meet the information needs of users; this is resource sharing. A federated institutional repository readily come in as a system that allows multiple institutions (typically universities or research organizations) to collectively manage and provide access to their digital content while maintaining the autonomy of each individual institution's repository. This concept supports the sharing and preservation of scholarly works, research data, and other academic resources across different institutions. To implement a federated institutional repository requires certain considerations including technical, organizational, and policy issues because institutions may need to align their data practices and engage in collaborative governance strategies to ensure successful operation and sustainability.

The benefits of federated educational repositories according to Dimitriadis et al. (2009) are to allow for:

- i. Re-use
- ii. Re-publish and share within their communities;
- iii. Supporting collaborative learning;
- iv. Providing tools for users for posting knowledge productions into a shared working space and for progressive discourse interaction among the users.

Institutional Repositories' Management Practices in the Library

The main duties of the library in the handling of repositories are acquiring, classifying and cataloguing, curating, preserving and providing access to the digital content. However, for effective management and use, there must be a policy document to guide its operation. Policy formulation and enforcement bring clarity to how the IR should be operated and the extent of its function including the formats of its contents. It lays down all the necessary rules and guidelines right from the beginning in order to ensure sustainability. Sucheth (2021a) in SCISPACE presented some management practices librarians need to do.

i. Acquisition - Collection management and stewardship of collection of contents for Institutional Repositories. The librarian ensures that the repository is populated with relevant scholarly materials that meet the needs of both faculty members and the students.

ii. Classifying - Establishing standard metadata for contents of the repository. According to Sang et al. (2020), metadata is data that provides information about other data describing the attributes and

contents of an original document. Librarians have skills to develop and use metadata schema to enable interoperability standards and protocols of metadata. By applying the knowledge of classification in the traditional library service, the librarian is able to provide description to the various items deposited in the repositories. This makes search and retrieval of the contents easier and faster. In addition, some librarians may require training in metadata development to enhance input.

iii. Curating - This is the process of gathering information relevant to a particular topic or area of interest, usually with the intention of adding value through the process of selecting, organizing and being responsible for the collection or exhibition. Librarians can curate resources from the repository on a specific trending topic and share the repository link via its social media handles.

iv. Preserving - It is pertinent that librarians develop a robust preservation strategy to safeguard the digital resources against data loss (ScienceDirect, n.d.). Preservation processes that can be adopted by libraries include regular backups, disaster recovery plans and use of reputable cloud computing services (Council on Library and Information Resources, n.d.).

v. Providing access to digital content: Although repositories are open, which means access to the contents should be open for all, however, librarians must establish access control for some contents. It is important to determine who can access specific resources and under what conditions. For instance, to access a funded thesis report may be require certain conditions.

vi. Promotion and marketing of the repositories. Ashworth (2006, as cited in Sang et al., 2020) asserted that, "librarians need to know all about the IR, its principles, benefits and operational processes in order to promote it and act as IR evangelists". Promotion and marketing can be carried out through face-to-face encounters, emails, flyers, posters and the library's social media handles highlighting the value and benefits of using the repository for teaching, learning and research.

Methodology

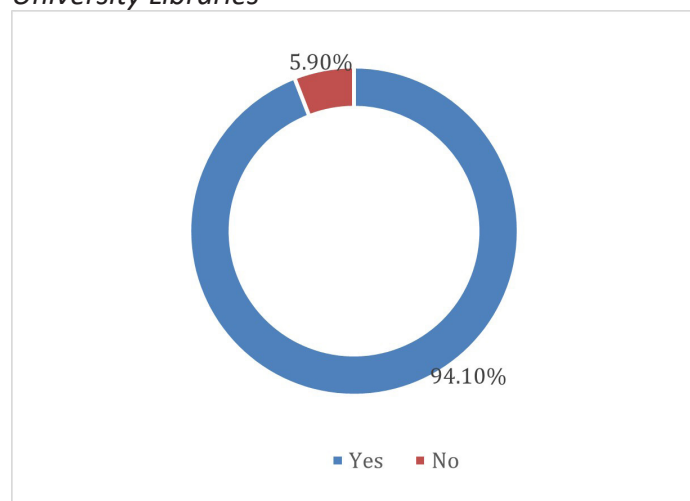
Data was collected using online survey approach by means of a structured questionnaire. The questionnaire was posted on the WhatsApp platform of the Association of University Librarians of Nigerian Universities group. Participation was opened to all the 270 university librarians in Nigeria as of July

2024. However, data collected based on the number of respondents was analysed using counts and simple percentages which are presented in charts.

Institutional Repositories and the Situation in Nigerian Universities

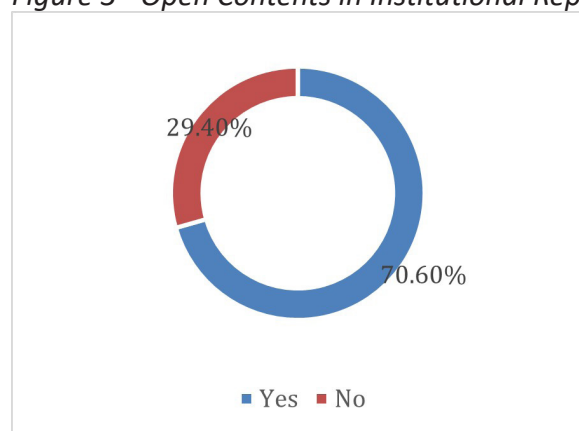
Data was collected from seventeen (17) university librarians to assess the state of repositories in the libraries. The results are presented in Figure 2.

Figure 2 - Availability of Institutional Repositories in University Libraries



Data in figure 2 show that majority of the respondents (94.10%) agreed that they have institutional repositories in their universities, while 5.90% did not have.

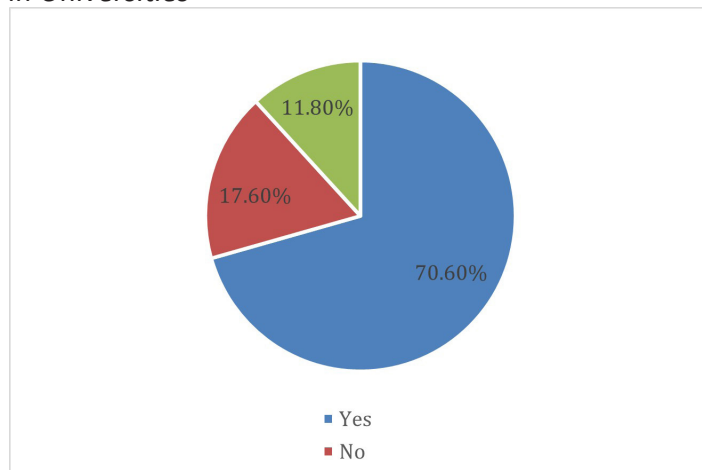
Figure 3 - Open Contents in Institutional Repositories



The Figure 3 shows that contents of the institutional repositories are open according to 70.6% of the respondents, while 29.4% of the respondents have contents that are not open. Considering the fact that the sample for this study is quite small, the data presented here is in line with the data about institutional repositories on the Directory of Open

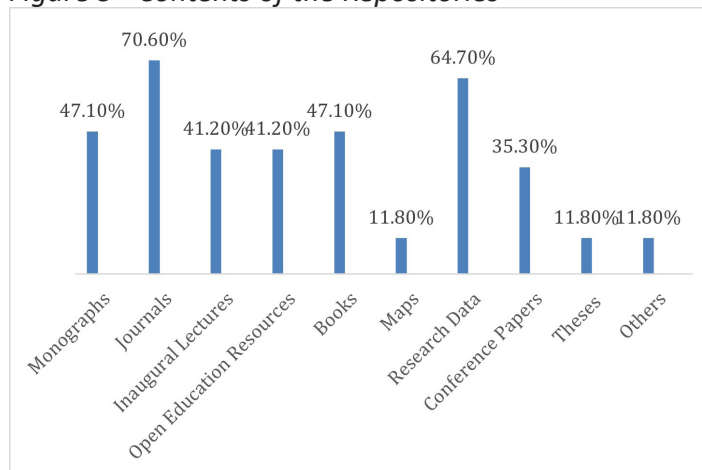
Access Repositories (OpenDOAR). The OpenDOAR has 32 Nigerian institutional repositories listed on their website (Abdu, 2025). The implication is that not all the 32 institutional repositories listed in OpenDOAR participated in the survey.

Figure 4 -Operational Institutional Repository Policies in Universities



In addition, data in Figure 4 shows a high percentage of the respondents 70.6% stating that they had operational institutional repository policies in their universities. Figure 4 also shows that 17.60% did not have operational institutional repository policy while 11.80% of the respondents were not sure if they were available. Having an operational policy for IRs is very important for the sustainability of the repositories. It is a working document for the librarian which can protect him/her in the event of litigation. Sucheth (2021a), in the steps for establishing IRs made creation of policy the first step which affirms the critical importance of IR policy. Therefore, with 70.6% of the IRs having operational policies is line with Singh.

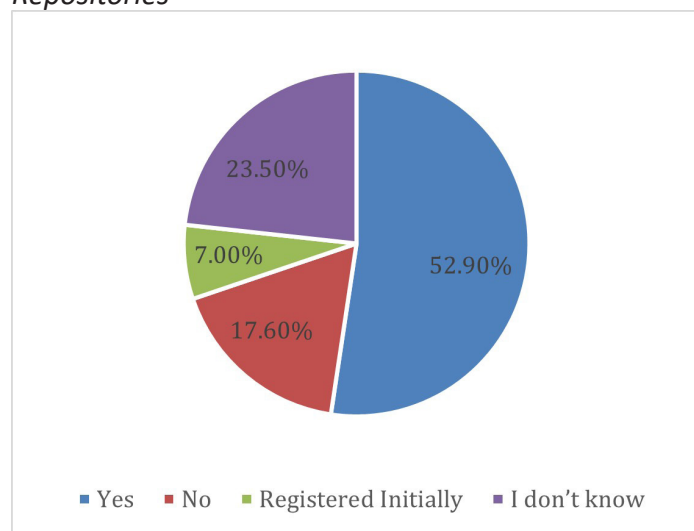
Figure 5 - Contents of the Repositories



The data in Figure 5 shows that the repositories

contain more journals than the other resources. Figure 5 further shows that research data are the second prominent resources (64.7%) in repositories. Other resources with significant presence were monographs and books (47.10%) each; inaugural lectures and open educational resources (41.20%) each (Clements et al., 2015); conference papers were (35.30%), while maps, theses and others made up 11.80% each. This collaborates Lynch (2003) that the contents of IR to include monographs, preprints and post-prints of academic journal articles including those undergoing peer review, Electronic Theses and Dissertations (ETDs), OERs, Datasets, Conference Proceedings and many more.

Figure 6 - Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) Compliant Repositories



Data in Figure 6 shows that only a little above half (52.9%) of the repositories according to the respondents, are registered on the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). The OAI-PMH is a protocol developed for harvesting metadata descriptions of records in a repository. This finding indicates why service providers may find it difficult to harvest metadata from Nigerian IRs for increased visibility.

Data in Figure 7 below shows that 82.40% of the respondents indicated that they trained their staff on repository management, which is commendable. Training and retraining are very pertinent for the effective management of repositories. However, 17.60% did not train their staff on repository management.

Figure 7 - Library Staff Training on Repository Management

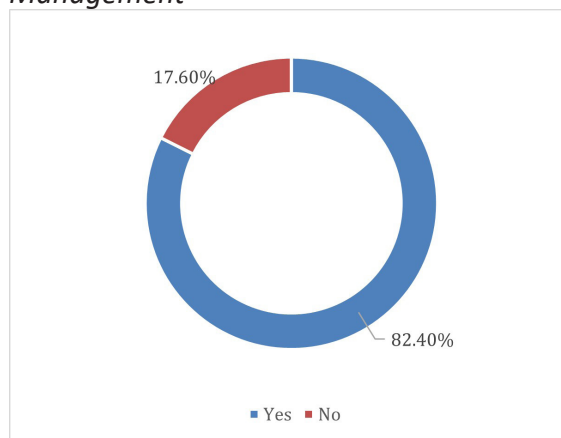
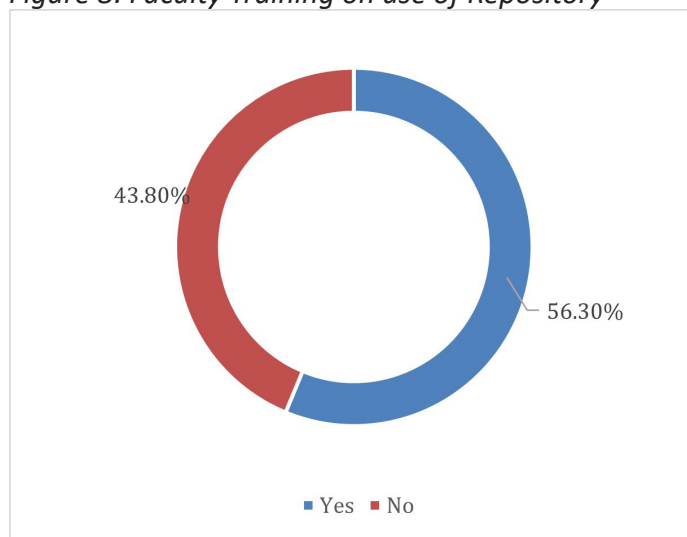
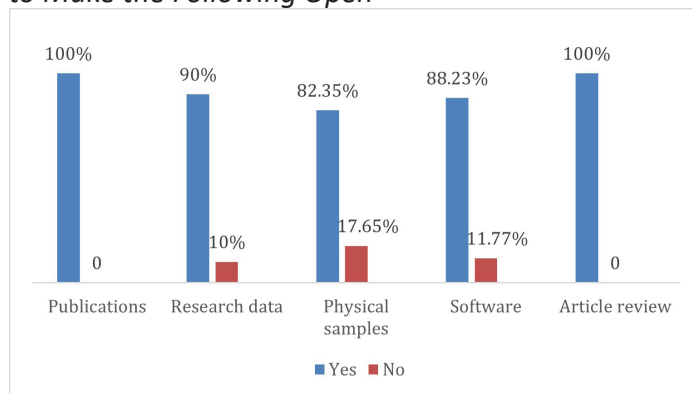


Figure 8: Faculty Training on use of Repository



However, only 56.3% of respondents indicated in Figure 8 that they trained faculty members on the use of the repositories. The remaining 43.80% of the respondents did not train faculty members.

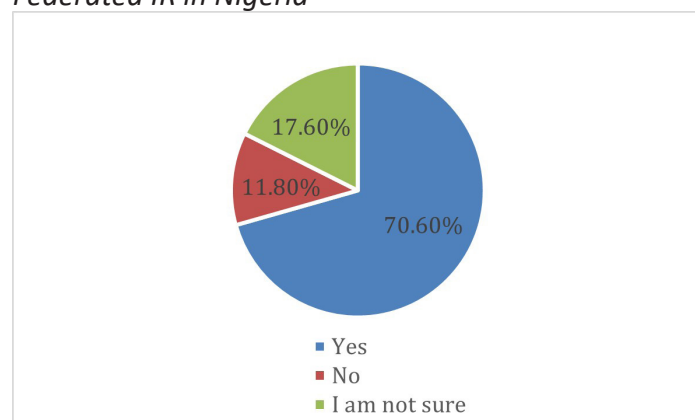
Figure 9 - Agreement with the Open Science Initiative to Make the Following Open



Although IRs must have contents, but the sustainability of these IRs goes beyond just having

these contents. The ability to find and access the contents among others is very crucial. The data in Figure 9 shows that the respondents agreed that most of the contents of IRs should be made open. All the respondents (100%) want publications to be open; 90% of the respondents agreed that research data should be open while 10% of the respondents did not support research data to be open; 82.35% of the respondents wanted physical samples to be open as against 17.65% who did not want it open; with respect to software, 88.23% of the respondents agreed to its openness while 11.77% did not agree; finally, article review process also received 100% agreement for openness. This is not surprising because librarians are stakeholders of the Open science initiative and advocates of open access (Tzanova, 2020).

Figure 10 -Opinion on Readiness of Libraries to go Federated IR in Nigeria

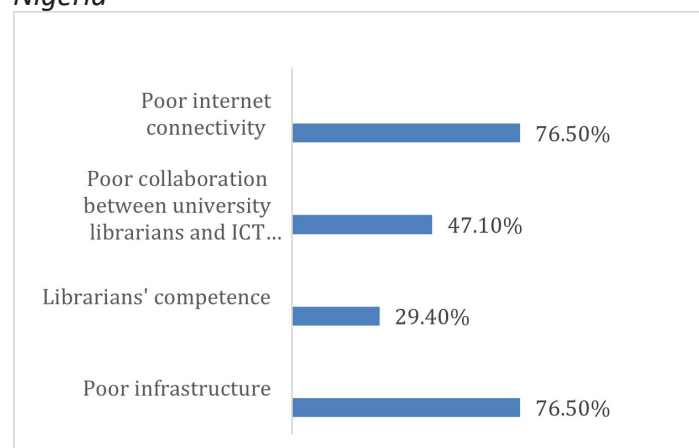


The data in Figure 10 indicates that majority of the respondents (70%) stated that their repositories are ready to be integrated into a federated IR in Nigeria; 11.80% of the respondents are not ready while 17.60% are not sure. A federated repository is networks of repositories that collaborate to provide a unified and coordinated system for managing and accessing data, resources and information. This is commendable as it will improve resource sharing among the institutions and further increase the global visibility of research contents from Nigeria.

Poor infrastructure and Internet connectivity (76.5%) each were the major perceived challenges of setting up a federated IR in Nigeria according to the opinions expressed in Figure 11 below. The problem of poor collaboration between University Librarians and Directors of ICT accounted for 47.10% which is not a negligible percentage; while 29.40% of the respondents also agreed that Librarians' competence is a challenge

to a federated IR in Nigeria. The finding is in line with Esse and Haliso (2023) who submitted that one of the challenges of IR sustainability in Nigeria and many other developing countries is that of Information and Communication Technologies and Internet connection.

Figure 11- Perceived Challenges of Federated IR in Nigeria



Conclusion

Although efforts are in place by the Tertiary Education Trust Fund (TETFUND) in Nigeria to develop a federated repository for theses; at the moment, there is no federated IR from the preliminary investigations, rather individual institutions establish and manage their repositories in isolation. However, libraries can access other federated repositories available online such as Global ETD search (for all theses and dissertations worldwide), OpenAIRE, Zenedo, PubMed Central, etcetera.

Establishing and managing federated educational repositories in academic libraries is a strategic need in this era where digital scholarship and information sharing are fundamental to the academic ecosystem. It not only supports academic achievements but also advances both knowledge and research and their global dissemination. As universities constantly change and adapt to new educational paradigms, effective management of federated repositories remains the cornerstone of universities' dedication to academic excellence, information dissemination and the advancement of society as a whole (Council on Library and Information Resources, n.d.).

Recommendations

Based on the findings of the study, the following recommendations are made:

1. University libraries in Nigeria should ensure

the availability of Open Institutional Repositories in their libraries

2. In-house training should be organised for repository managers regularly as well as faculty members to improve contents and its management

3. There should be an improved collaboration between the University Librarians and Directors of ICT for improved service delivery using the Institutional Repository

4. All IRs in Nigerian universities should be federated to improve access to information

5. IR policy should be developed by all university libraries

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Corresponding Author

Jibril Attahiru Alhassan
j.alhassan@futminna.edu.ng