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Adoption of DSpace Software for the Development of Institutional Repository: Ajayi Crowther University Experience

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Abstract

Academic institutions are increasingly recognising the importance of establishing robust repositories to preserve and disseminate their intellectual output. The paper report the success story of running the Institutional Repository of Ajayi Crowther University on the Dspace software. Going forward and going by the post implementation and utilization, it is expected that the repository will enhance research collaboration, access to scholarly publications and promote the research visibility of academics within and outside Ajayi Crowther University. The repository was focused on the preservation and making publicly available, the intellectual output of the university in order to support knowledge sharing among researchers as well as increase the web visibility of the institution. Issues that were considered during the take-off of the project included software selection, software customisation, technical architecture, networking, digital competence in the management of the repository, policy, and capacity building, among others. The challenges faced during the implementation period were related to funding and electricity issues. The paper provides valuable insight into the transformative potentials of open-source technologies such as DSpace and also providing best practices guidelines for any universities considering the implementation of institutional repository with limited budget. The study concluded by proffering strategies and guidelines on best practices for installation and implementation of Institutional repositories by institutions who might want to flag theirs on meager and/or limited budget

Keywords: DSpace, Institutional Repository, Ajayi Crowther University, Best practices

Introduction

The digitisation of information and the evolution of scholarly communication have significantly transformed the ecosystem of academic institutions, which underscores the need for robust and efficient systems to manage, preserve, and disseminate scholarly outputs. In response to this development, many educational institutions have turned to Institutional Repositories (IRs) as a strategic solution for organizing and showcasing their intellectual output. Lynch (2003) noted that academic institutions have developed institutional repositories, which provide digital infrastructure for the preservation, wider dissemination and open access of scholarly outputs

With the increasing number of intellectual and scholarly outputs, academic institutions became primary repositories for these resources. Repositories emerged out of human efforts to organize records for storage, preservation and long-term use (Imoro and Saurombe, 2023). Repositories have long existed in the form of libraries, museums and archives (Huvila, 2016; Torres, 2016). From the era of clay tablets and papyrus to books and e-resources, technological innovations have shaped the nature and format of the collections stored by these repositories; institutional repositories (IRs) are no exception.

The outset of the millennia presented the production and proliferation of EPrints software. Subsequent to this in 2002 was the release of Digital Common and DSpace software repository, respectively. This experience had laid the foundation for the IR bubble which busted across academic institutions. Institutional repositories are digital archives for collecting digital materials for long-lasting management, preservation and dissemination of research output as produced by institutions (Kumah and Filson, 2022). Akinola, et al., (2022) viewed institutional repository as a new paradigm for storing and management of the research output of an institution.

IR is a web-based accessible database that captures, stores, indexes, preserves and disseminates an institution's intellectual output in digital environment. A university-based institutional repository according to (Aminu, et al., 2022), is 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. Likewise, Marsh (2014) define institutional (university-based) repository as a mechanism for capturing, archiving and managing the collective digital research outputs of the institution.

The differences in approaches adopted by universities have created a landscape for institutional repositories that is not completely consistent. According to O'Brien (2023), institutional repositories (IRs) are digital collections that curate and disseminate the intellectual output of an institution. Carlson (2020) called it Institutional Data Repository (Data IRs). He went further to describe it as repositories developed by academic library to support researchers affiliated with specific institution to comply with funder or published data requirements. He believed that investing in Data IRs is a natural extension of the mission of libraries in ensuring long-term access to information.

There are various software platforms on which the institutional repositories can be built. Among these is the DSpace which has emerged as a popular choice for the development of IRs due to its open-source nature, flexibility, and extensive community support. DSpace is an open-source repository software hosted by LYRASIS, which also supports DuraSpace, DuraCloud, VIVO and Fedora, and developed by MIT Libraries and HP Labs (O'Brien, 2023). DSpace is a software that helps in the creation of digital repositories in many different environments and is mostly strong on aiding long-term digital maintenance (Rajawat, 2017). It provides institutions with a customizable and scalable solution for creating, managing, and preserving digital collections.

The adoption of DSpace for Institutional Repositories has gained popularity over the years, going by its efficacy in meeting the diverse needs of academic and research communities.

The decision to adopt DSpace is often rooted in its compliance with industry standards, such as the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and the Dublin Core Metadata Initiative (DCMI). These standards ensure interoperability and seamless integration with other repositories, fostering a collaborative and interconnected scholarly ecosystem. Furthermore, DSpace's user-friendly interface facilitates easy deposit of content by researchers and administrators, enhancing the overall user experience. One of the notable advantages of DSpace is its robust preservation capabilities, supporting long-term access and integrity of digital assets.

The platform employs industry best practices for archival storage, ensuring that institutions can confidently manage, preserve, and provide perpetual access to their valuable intellectual output. This study is set within the context of Ajayi Crowther University Institutional Repository (ACUIR), to help other institutions who are planning to embarking on the project to gain insight into the adoption of DSpace in the development of IR; the tangible benefits of IR to the institution and potential challenges that they may have encountered in the course of the adoption and implementation of DSpace for the institutional repository.

In this context, this paper reports a detailed account of how to leverage the benefits of DSpace software for the development of Institutional Repositories, examining its key features, advantages, and successful implementation and launch at the Ajayi Crowther University, Oyo. Thus, the paper will serve as guide to best practices in the implementation and management of institutional repository.

Statement of Objectives

The aim of this paper is to document the adoption of DSpace software for the implementation of Institutional Repository at Ajayi Crowther University. The specific objectives of the paper are to:

1. Describe the step-by-step process involved in the selection and implementation of DSpace software for the development of Institutional Repository at Ajayi Crowther University
2. Identify the technical infrastructure and institutional requirements needed for deploying and maintaining the Ajayi Crowther Institutional Repository
3. Highlight the major challenges faced during the implementation period of Ajayi Crowther Institutional Repository
4. Assess the impact of the Institutional Repository on the preservation and dissemination of the intellectual outputs of Ajayi Crowther University.
5. Provide strategies and guidelines on best practices for installation and implementation of Institutional repositories for other academic institutions seeking to institutional repository

Literature Review

The DSpace software

DSpace is an open-source software designed for managing, preserving, and providing access to digital content (Udya, 2023). It is commonly used by academic, research, and cultural institutions to build institutional repositories, digital libraries, and archives. Kanwar (2018) define DSpace as an open-source digital repository system designed to capture, store, index, preserve, and distribute scholarly materials in digital formats. DSpace was developed by the Massachusetts Institute of Technology (MIT) and Hewlett-Packard (HP) in 2002 (Hamil, 2019), and has evolved over the years to become a widely used platform in academic and

research institutions for managing and disseminating digital content. The adoption of DSpace as a system entails the understanding of some its important aspects. These aspects of Dspace are highlighted by (Dangi and Gautam, 2024; Chaudhari and Patel, 2021) to include its core features, architecture, customization, functionality, integration and interoperability.

A. Core Features

According to Khan and Shahzad (2022) DSpace features a user-friendly interface, customization, reliability, security, metadata management, web-based search, advanced searching and consultancy.

i. **Open Source:** DSpace is distributed under the BSD License, making it freely available for institutions to use, modify, and distribute.
ii. **User-Friendly Interface:** DSpace provides an easy-to-use web interface for both administrators and end-users.
iii. **Customization:** Institutions can customize the appearance and functionality of their DSpace installations to suit their specific needs.
iv. **Metadata Management:** It supports the creation and management of metadata to describe digital content comprehensively.

B. Architecture

Kukuma, et al., (2023) noted that, DSpace follows a modular architecture with a two-tier structure: the Backend Storage layer and the Frontend User Interface. The backend employs a relational database (typically PostgreSQL or Oracle) for metadata storage, while the frontend offers a web-based user interface for content submission and retrieval. The additional part of DSpace architecture is the Bitstreams Storage, which stores digital assets, or bitstreams, separately from metadata, facilitating efficient storage and retrieval.

C. Functionality

DSpace provides a range of functionalities including metadata creation, versioning, access control, and search capabilities (Mohan and Singh, 2023). It supports various file formats and allows users to upload, manage, and retrieve content easily.

D. Community and Customization:

DSpace has a vibrant user community that contributes to its development and enhancement. According to (Becker, et al., 2020), it allows institutions to customize the platform to meet their specific needs through the creation of new themes, plugins, and modules.

E. Preservation and Security:

DSpace focuses on digital preservation, ensuring the longevity of stored content. It provides mechanisms for backup, replication, and integration with preservation tools (Masenya and Ngulube, 2021). Security features include access control policies and authentication mechanisms.

F. Integration and Interoperability:

DSpace, according to (Goncharov and Kolosov 2021) supports interoperability through standard protocols and metadata schemas, facilitating integration with other systems. It complies with Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and other standards. Also, DSpace integration with authentication systems like LDAP and Shibboleth allows institutions to implement single sign-on and access control.

An Overview of Institutional Repository (IR)

An institutional repository (IR) is a digital collection that preserves and provides access to the intellectual output of an institution, such as research articles, theses, datasets, and other scholarly works (Adeyemo and Jamogba, 2021; Okon, et al., 2020). As submitted by the authors, a properly dimensioned institutional repository has the potential to increase research impact and enhance the visibility of an institution through its scholarly outputs. IR serves as concrete indicators of an institution's quality and demonstrates the scientific, social and economic relevance of an institutional research activity, thus, increasing the institution's visibility, status, and international outlook (Akinola, et al., 2022).

Institutional repositories are built on software platforms which varies from subscription-based IR platforms to open-source IR platforms (OS). The Subscription-based IR platforms are increasingly gaining prominence in the IR space because of their potential to reduce total ownership cost and construction time (Upasani, 2016). However, many proponents of Open-Source Software (OSS) believe that organisational structure of OSS and the subsequent development of dedicated online communities or user groups are key features which, together with compatibility and ease of customization, make OSS a cost-effective option (Ray and Ramesh, 2017).

Institutional repository has the potential of increasing the visibility, prestige, ranking and public value of researchers and universities (Anenene, Alegbeleye & Oyewole, 2017). Just few years ago, universities in Africa started developing institutional repositories to showcase their

institutional resources, thereby increasing their visibility and better performance in the ongoing web ranking of world universities in particular.

IR is not defined by the type of data it stores but by the purpose it serves. In essence, it captures, selects, collects, manages and disseminates the intellectual output of a single or multi-university community. A university-based institutional repository as defined by Kumar (2019), is 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.

Odili (2017) view an institutional repository as a mechanism for capturing digital collections and preserving the intellectual output of a single or multi-university community. Ejikeme and Ezema (2019) noted the potential of IRs in providing open access to institutional content, emphasizing the importance of accessibility for research dissemination. In the view of Usman and Kiran (2019), institutional Repositories (IRs) are deployed mainly to create global visibility for scholarly output of institution which in return increase the recognition and prestige of the institution.

Need for Institutional Repositories in Universities

In the early years, institutional repositories were primarily seen as platforms for archiving and disseminating scholarly publications (Saini, 2018). According to Eromosele, et al., (2022), the development of an institutional repository for academic and research libraries makes possible the visibility of localized scholarly contents on web platform and also provide open access to restricted resources. Institutional repositories in Nigerian universities were borne out of the need to address problems inherent in the present system of scholarly publishing (Akinola, et al., 2022). Idiedo, et al., (2024) found the problems to be the affordability of key journals, with subscription costs rising faster than the rate of inflation and far outstripping library budgets and the loss of key resources if e-journal and database subscriptions are cancelled by libraries. Loss of access to research resources as well as, output may consequently reduce the 'research impact' of the work of scholars and researchers.

Institutional repositories are seen as having a role to play in overcoming these problems, a cost-effective method of providing access to research findings and improving the 'research impact' of an institution. Institutional Repository according to Iheanacho-Kelechi and Uche (2020) was conceived out of the desire to handle the problems of presentation, organization and dissemination confronting libraries on digital content. (Esse and Yacob-Haliso, 2024; Sambo, et al., 2022) also posited that the 'why' of Institutional Repository can be summarized as a

result of ever rising cost of journals, insufficient library budget, unstable exchange rate and development in technology.

Benefits of Institutional Repositories

The evolution of institutional repository has gone through series of modification since its emergence. At the kickoff of the initiatives gaining acceptance in the dawn of 1990s and late 2000s, the emphasis was basically for conservation and archiving. These roles have now grown that institutions no longer use institutional repository solely to store, manage, present and disseminate their research. Institutional repository now has many advantages that institutions, researchers and scholars can exploit. It has great potential for value added services and offers a wide choice of advantages to researchers, scholars, institutions as well as teaching, learning, the global research communities and the wider world.

In recent years, the importance of institutional repositories has been put forward by various scholars and practitioners. A study by (Dorta-Gonzalex and Dorta-Gonzalex, 2023; Demetres, et al., 2020) submitted that the role of IRs involves an increase in the visibility and citation impact of research outputs. They found that articles deposited in institutional repositories tend to receive more citations than those not deposited, highlighting the positive impact of open access through repositories on research dissemination.

Also, Itani and Ostlundh (2021) explored the evolving role of institutional repositories in the context of advancing open digital scholarship. They discussed how IRs are evolving beyond traditional storage and dissemination functions to become integral components of broader digital scholarship ecosystems. This transformation includes the incorporation of multimedia content, interactive elements, and enhanced metadata to support a more comprehensive understanding of scholarly works.

Further, institutional repositories also play a crucial role in preserving and disseminating theses and dissertations. Tapfuma and Hoskins, (2021) and Salau, et al., (2020) in their separate studies examined the impact of institutional repositories on the visibility and accessibility of electronic theses and dissertations (ETDs). Their findings highlighted the positive correlation between the availability of ETDs in repositories and increased global visibility, demonstrating the repository's role in enhancing the global reach of graduate research.

The evolving landscape of institutional repositories is also discussed by Solomon, et al., (2023). They explored the challenges and opportunities presented by emerging technologies, including artificial intelligence and machine learning, in enhancing the functionality and usability of institutional repositories. The authors argued that the integration of these technologies can lead

to more efficient discovery and retrieval of scholarly content within repositories, further increasing the impact of institutional research.

In an era of digital publishing and archiving, academic and research institutions are increasingly recognizing IRs as an important component of modern-day scholarly communication, preservation and dissemination (Saini, 2018). While most academic and scholarly databases can only be accessed only by subscription, research papers archived in IRs are totally free (Tsay, Wu and Tseng 2017). It is believed that the free availability or access to the content of IRs is a feature that could help enhance collaboration among both local and international research institutions seeking to expand the frontier of knowledge through open science and data. Having gleaned through the literatures, it may be safe to conclude that the advantages of institutional repository include the following:

1. Institutional repository offers instant access to information and knowledge resources created globally
2. It increases the visibility and impact of research outputs of institutions.
3. It serves as a steady extension of academic institution responsibility as originators of research and preserves and leverages their members ' intellectual assets.
4. Institutional repository serves as a potentially major component in the evolving structure of scholarly communication.
5. It enable institutions and faculty to offer long-term access to digital objects that have persistent and prolong value.
6. It extends the central tasks of libraries into the digital environment by providing reliable, scalable, coherent, and free access to libraries' holdings for the world as a whole
7. It increases the global visibility and utility of institutional researches and introduces an innovative research culture enthralled on meeting international standard and values.

Institutional repositories serve as vital components in the scholarly communication ecosystem, providing open access to a wide array of research outputs. Scholars and practitioners recognize this role in increasing visibility, citations, and global impact of institutional research. As the digital scholarship landscape continues to evolve, institutional repositories are adapting to incorporating new technologies and functionalities, ensuring their continued relevance in the dynamic world of academia.

Issues and Challenges in the Development of Institutional Repository (IR)

Baro and Nwabueze-Echedom, (2022) evaluated the development of IRs associated with the development in African universities. The result of their findings revealed the challenges of IR to be inadequate facilities, unstable internet connectivity, lack of funds, irregular power supply, and lack of skilled information technology personnel. Likewise, Asadi, et al., (2019) conducted a systematic review of Institutional Repositories with a focus on higher institution of learning, and found that absence of knowledge of open access IRs and inadequate information and communication technology infrastructure are significant challenges involves in the development of open access IRs. Also, Joo, et al., (2019) in their study investigated the issues and challenges of development of institutional repositories, the outcome of their investigation revealed that limited resources, budget, and staff readiness are major factors preventing the development and deployment of services in institutional repositories. In addition, Chisita and Chiparausha (2020) while examining the security and ethical considerations encountered on the development of Institutional Repository at the Bindura University of Science Education, Zimbabwe, highlighted the challenges in managing IRs to include cyber security threats, unauthorized access, and ethical concerns like plagiarism and predatory publishers.

Furthermore, Igboechesi, et al., (2023) investigated the sustenance of the relevance of Institutional Repository in academic libraries in Nigeria and found that the major challenges in developing institutional repositories include limited qualified manpower and network issues. Similarly, Kyprianos and Lygnou (2022) conducted a research on Institutional repositories and copyright in Greek academic libraries. They found that Greek academic libraries with institutional repositories face intellectual property difficulties, with the biggest issues being a lack of knowledge of copyright. Moreover, Khan and Sheikh (2022) carried out a study on Open source software adoption for development of institutional repositories in university libraries of Islamabad and according to them, the major challenges in using open-source institutional repository software include selection of suitable software and materials for digitization, lack of cooperation from parent organizations, inadequate training opportunities, and lack of skilled staff.

Development of Institutional Repository: The Ajayi Crowther University Experience

The development of institutional repository (IR) in Ajayi Crowther University (ACU) went through a planned process. The process started in April, 2023, and ended in August, 2024 with academic staff training on self-archiving. Though, the update and maintenance is continuous. The successful implementation of the ACU repository can be attributed to institutional support

and readiness to have the infrastructure; it is a complementary and collaborative effort between the University Library and the University Management.

The Role of the Library:

Development Stage

The library at Ajayi Crowther University known as *T.Y. Danjuma Library* played significant role in the successful design, launch and implementation of the repository. The leading and visionary role played by the library was evident from the outset and birthing the idea, and also spare-heading the processes and activities. Particularly, in providing needed leadership to create a digital space where Ajayi Crowther University scholarly output can be collected, preserved, and disseminated. The need to increase the web ranking of the institution, be globally visible, create global visibility for and provide open access to graduate research, as well as to enhance the citation metrics of the university researchers were part of the criteria that informed the need for the development of the repository

Some of the procedures undertaken and issues considered in developing the ACU repository include: Technical infrastructure, Content management (types of content to be deposited on the IR, and content harvesting), repository policies governing the use of the IR, promotion and sustainability of the IR among others

Technical Infrastructure:

Issues that were considered under technical infrastructure were related to identifying appropriate technologies to be deployed for the development of the IR. Some of these issues include: software selection, hardware requirement, Software installation and customization, internet services, electricity, digital competence of the repository managers and personnel at the electronic section of the library. To achieve some of these requirements, the library was in close collaboration with the Directorate of the Information and Communication Technology (DICT).

Software Selection: This was the first issue considered under the technical infrastructure. Software selection involves choosing a solution with a great technical functionality. There are a number of software that can be used for the development of institutional repositories, such as DSpace, EPrints, Fedora, Greenstone and Invenio. Preliminary investigation of institutions that have implemented institutional repositories within and outside Nigeria showed that DSPACE (Digital Signal Processing and Control Engineering) was popular and well accepted. It was on this basis and other outstanding benefits and features of the software that the library selected

and adopted Dspace for the implementation of the Ajayi Crowther University repository. Some of the benefits and features inherent in the Dspace are listed below.

- It facilitates the capturing and ingestion of materials, including metadata about the materials.
- It facilitates easy access to the materials, both by listing and searching.
- It facilitates the long-term preservation of the materials.
- It is capable of handling a multitude of digital formats – it manages and preserves all formats of digital content (PDF, Word, JPEG, etc.).
- All contents on IR created by DSpace are easily indexed and accessible on Google Scholar.
- It is completely customizable to fit users' needs.
- Its interface is available in multiple languages.

Hardware Consideration: here, the issue of *server* was majorly considered. Two options were presented; implementation of the IR on a regular/physical server or on a cloud-based server. The financial weight of cloud-based server was much, especially when the issue of financial sustainability on the long term basis was considered. Because, getting a cloud instance for the nature of the infrastructure, with moderate *Persistent Disc and RAM* could cost up to *100 – 150 dollars* per month – which can run to between $1,200 – 1,800 annually. Also, the increasing naira – dollar exchange rates can make it a financial burden on the institution. On this basis, the library settled for the physical server implementation. Again, getting a good physical server cost much at that point.

However, the library's desire to float the IR, despite its meager fund drove her with minimum budget, what the library did was to leverage on the available hardware in the e-library, at least, in the first instance. We identified a good computer system in the data center and upgraded the system configuration to 1TB HDD / 8GB RAM to create a makeshift server. With this system configuration, we were sure of the initial take off.

All these were done with the intention of getting a new server that could accommodate large content and heavy traffic as they increase overtime, particularly, getting the university management's support after the successful implementation of the IR

*Software installation and customization***:** The library tapped into the resourcefulness and digital competence of the e-library personnel to achieve this phase. The Dspace software was successfully installed and customized to reflect the institution brand.

Internet Services: The University has high speed internet service, with a Campus Wide Area Network (CWAN). We made use of this, working closely with the ICT directorate for appropriate configuration that will push the IR to the web. A dedicated internet cable and public Internet Protocol (IP) address was configured on *the makeshift server.* Besides, the ICT directorate created a subdomain and pointed the public IP address to the domain. The domain worked well and IR was up and running.

*Electricity***:** constant supply of electricity is required to get an institutional repository up and running 24/7. It is particularly important for us because, we deployed the repository on a physical server. We have a Solar Power System that could power all equipment and appliances in the server room. With that, the repository server was assured of 24-hour electricity supply.

Content management and policy considerations:

At this stage, our major consideration was the identification of the type of items that would be deposited in the repository and modalities of harvesting those items. Thesis and dissertations, Staff publications, inaugural lectures, University lectures, conference proceedings and such other intellectual output of the university were strongly considered as important items that could be deposited into the repository.

Some of these items have the library as their natural habitat. For graduate research, the library is pooling all resources to ensure that past graduate research which are in hardcopy are digitized for upward migration into the repository. The library is also liaising with the postgraduate college to ensure that graduate students submit electronic version of their research along with the print version to the library.

To get staff publications, the library sent out circular to all faculties and departments requesting academic staff for the electronic copies of their publications (that are open access or has no copyright restrictions other than the author) to a dedicated email created for that purpose, while also requesting that they submit the print version, especially those that do not have online visibility. What the library planned to achieve with this was to use the repository as an online platform that will give those researches lying on the open racks of the library and or on the personal shelves of the researchers, an online visibility and to provide open access to those *'hidden knowledge'.* And to have a good number of items in the repository before lunching it to the web, so as to facilitate its quick indexing

Interestingly, the academics responded to the call, and the library received a large volume of print articles, mostly those that the publishing outlet do not have web presence. We also received a considerable amount of electronic version of articles in the dedicated email address. The library digitized the print articles into searchable PDF document format for upward migration into the repository, using *Hp Scanjet Pro 2500 F1 Flatbed A4 Document Scanner.*

Figure 1*: Hp Scanjet Pro 2500 F1 Flatbed A4 Document Scanner*

With this device, we were able to digitize over 250 journal articles that were ready to be migrated into the repository. The digitization of the articles took a period of six (6) months

Policy issues and consideration

Our policy considerations were guided by professional and technical knowledge, as well as the general extant laws on important aspect of the repository. As a result, there was an unwritten policy, however, mechanism have been put in place, post implementation to have written guidelines in form of a rule book that will guide the general administration of the repository.

*Submission, Review and Inclusion Guideline: i*t was decided that only members of Ajayi Crowther University (Librarians, Lecturers, Graduate students and other staff) should be able to submit items to the repository. Items that can be submitted include: theses, research articles, and other technical or intellectual output of the university, in pdf, and .ppt file extension. Members of the university submitting content to the repository must be the copyright holder of such items. However, before accepting any submitted items into the repository, it undergoes review to ensure that the submitter adheres to the submission guidelines, more importantly, before submitting, the submitter is expected to accent to a license agreement statement thus; '*granting Ajayi Crowther University the right to archive his submission, and that the submitter will be liable for any form of copyright infringement*'. This guideline is to ensure consistency and quality of items going into the repository and the overall integrity of the repository.

Item Description: in order for the repository items to be easily discoverable, and for easy retrieval, the bibliographic description of the item included important fields such as: title, author, abstract and keywords.

Data Security and Privacy: some of the measures we put in place to guide against unauthorized access and loss of data include: setting up a regular backup system. The submitter will register for an account, the institution's email address is required for the registration. Any email other than the institution's email will be considered extraneous and subsequently deactivated. This is to ensure the integrity of the repository item and protect the private data of the repository users.

Ethical Considerations: To protect the institution and authors from any form of litigation, we considered copyright issues and intellectual property right. In other to check the copyright compliance of the items submitted, we review the item before accepting the submission, by checking the open access status of the item, and self-archiving policy of the publisher using *Sherpa Romeo* 'a platform that analyses publisher open access, copyright and archiving policies'. This is to ensure that the ACU repository operates within the legal framework and in compliance with ethical standards

Personnel's Digital Competence

The personnel at the e-library had the basic, intermediate and advanced digital literacy. This means that there are staff who possesses basic digital skills and knowledge, and who can perform simple digital task. While others demonstrate competence in the management of digital collection, drive digital innovations and projects. These competencies were particularly demonstrated in the software selection, installation, customization, digitization stages of the implementation

Promotion of the Repository

Following the complete launch and implementation of the project, the IR was made available on the web. We informed the academic community about the IR's availability and encouraged those, whose articles were uploaded to the webpage and download the electronic versions of the articles. This was done to push website traffic to the webpage in anticipation of quick

indexing. Consequently, the repository was indexed by *Google Scholar* within the first two weeks of its availability on the web.

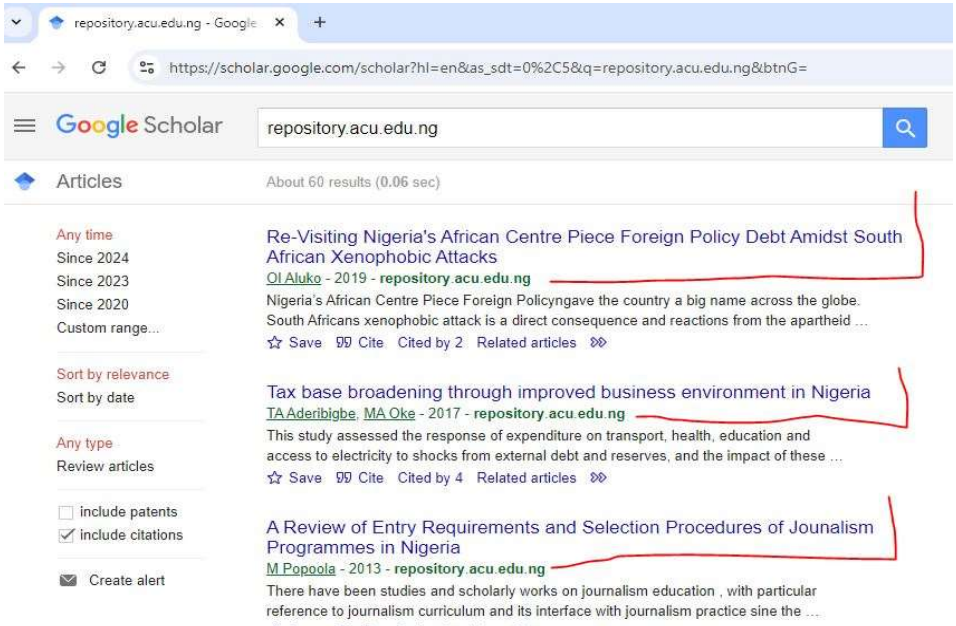

Figure 2 Indexing of ACU IR in on Google Scholar

As a follow up to that, the library conducted training on self-archiving for academic staff. The aim was to create awareness on the use and benefits of institutional repository, and since the library had uploaded a significant number of items to the repository, the training was to also equip academic staff with the requisite knowledge to self-archive their publications on the repository. This will allow the library to focus on other aspect of the repository. We created a step-by-step training guide, in form of slides and video tutorial to server as reference and backup to the physical training, which was shared among the academics.

Besides, as part of effort to create global visibility for the repository, the library applied for inclusion in the Directory of Open Access Repository; a quality-assured, global Directory of Open Access Repositories that host repositories that provide free, open access to academic outputs and resources. After fulfilling the OpenDOAR inclusion criteria, our request for inclusion was accepted, and was subsequently listed in the global Directory.

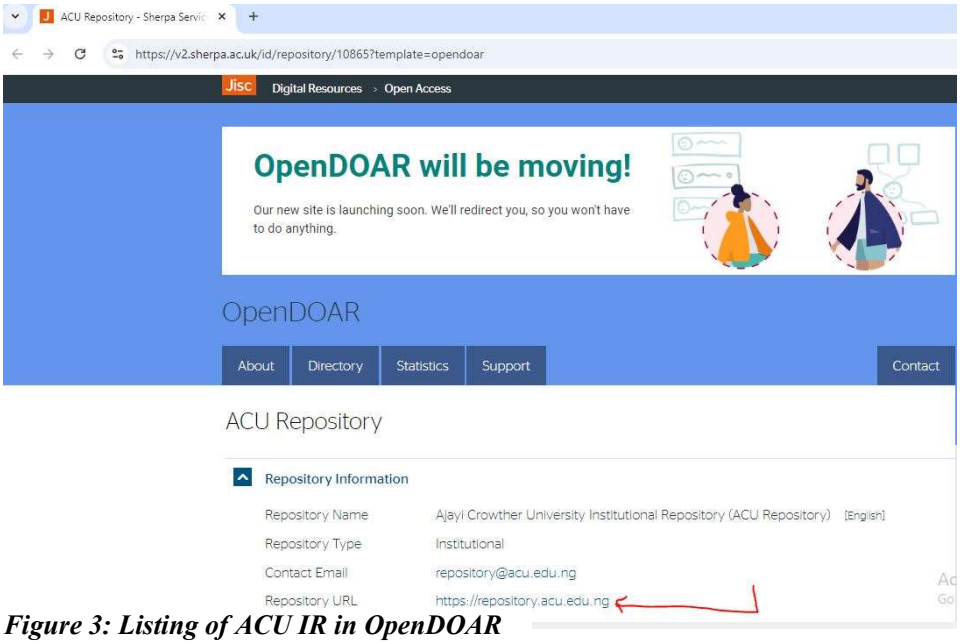

Figure 3: Listing of ACU IR in OpenDOAR

Feedback and support

The library created a dedicated email for feedback and support on self-archiving and other related matters. Library has a WhatsApp platform known as '*ACU Researcher'* which is used for regular updates on research and academic promotions. The platform is used to give regular updates on technical and maintenance issues.

Role of the University management

The implementation of the institutional repository was a welcomed development to the university management. The management played supportive and complementary role that saw to the successful implementation of the repository, and has taken strategic steps towards the continued operation and sustainability of the repository. Some of the efforts made by the management include:

- Installation of solar powered system that could power all equipment in the electronic library; this ensures uninterrupted electricity supply.
- Provision of a standard physical server. With this device, we were able to install an upgraded version of Dspace software, and migrated the backed up data from the old installation to the new one.
- Provision of an HP scanner and other supportive hardware infrastructure, which was used for digitization
- Provision of high speed internet services that enhances the availability of the IR on the web

Challenges faced during implementation

The major challenge was funding at the development stage. This was unconnected with the peculiarity of private universities in Nigeria, with no external source of fund, and library vote, especially for this type of project. We had to also grapple with electricity issue at the development stage, because we depended on the national grid for electricity supply, which extended the timeline of the project.

These challenges were experienced because the library independently undertook the project on a very little budget, but leveraging the available human and material resources within the library space. This is done with the intention to implement the project to an appreciable level before bringing it to the attention of the university management. Interestingly, the university management bought into the vision and saw the resource as an important university resource, thereby turning the state of the project round through the provision of needed infrastructure.

Conclusion

The adoption of DSpace software for the development of the Ajayi Crowther University's institutional repository (IR) has made it possible to further promote the visibility and provide open access to the intellectual output of the university. As a result, the university has been able to manage, preserve, and share its intellectual output, using the software.

The implementation of the IR has improved knowledge sharing among researchers in the university. This can positively influence the university's academic profile within the global academic community. The provision of basic infrastructure by the university management provided solutions to the challenges faced during implementation of the IR. Nigerian libraries planning to implement such project, but faced with financial constraints, may like to adapt some of ideas in this write-up.

Overall, as the repository continue to expand and going forward, it is expected that the ACU repository will further support the university's academic growth and improve its standing within the comity of local and international universities.

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