
A Survey of Open Access Institutional Repositories in Nigerian University Libraries: The Current State

Victor Okeoghene Idiedo*, Christopher Agbeniaru Omigie**, Loveth Ebhomeye***

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ABSTRACT

The purpose of the study is to investigate the development of institutional repositories in university libraries in Nigeria. The study adopted a survey research design. Online questionnaire, IRs investigation, and interview methods were used to collect data from the 21 university libraries that have developed IRs in Nigeria. The study revealed that only few universities have successfully developed open access IRs to preserve and manage their intellectual outputs emanating from their universities. Contents such as journal articles, theses/dissertations, and conference / workshop papers were found to be the most popular contents that are hosted in the IRs. The interview revealed that although few respondents mentioned having IR policy statements in areas such as access policy, submission policy, preservation policy, content policy and copyright policy, the majority mentioned not having any defined policy in their IR. Also in the interview, inadequate fund, challenge of collecting contents for the IR, shortage of skilled ICT personnel, and inadequate facilities were the most mentioned challenges encountered in the development of IRs in Nigeria. Findings from this study will inform University Librarians, university management and policy makers on the need to provide the necessary infrastructure and formulate policies for smooth development of institutional repositories to make research visible globally. The results will therefore provide important data and insight into the development of institutional repositories in university libraries in the context of developing countries.

1. Introduction

Institutional repository (IR) has the potential of increasing the visibility, prestige, ranking and

* Senior Librarian Bayelsa Medical University, Yenagoa, Nigeria (evergreenvictor@yahoo.com) (First Author)(Corresponding Author)

** Lecturer I and Acting Head of Department of Library and Information Science, Ambrose Alli University, Ekpoma, Edo State, Nigeria (Cvchris72@gmail.com) (Co-Author)

***Assistant Librarian at the Niger Delta University, Amassoma, Bayelsa State, Nigeria (ekeata@yahoo.com) (Co-Author)

public value of researchers and universities. The development of IRs, as expressed by Lynch (2003) is an indication that the intellectual life and scholarship of universities will increasingly be represented, documented and shared in digital form and that a primary responsibility of our universities is to exercise stewardship over such resources. University repositories are seen as strategic mechanisms to expand diversity and ensure worldwide availability of digital scholarship using opportunities of the networked digital environment to strengthen teaching, learning and research activities (Sang, Odini, & Wamukoya, 2022).

It is sad to note that only few Nigerian universities have their presence in OpenDOAR (OpenDOAR, 2022). The African universities have not made their presence in OpenDOAR simply because they lack visibility, many of them have not created institutional repositories to showcase their research power to the world (Oguche, 2018; Salau et al., 2019; Mutsvunguma, 2019). For example, In the Centre for World University Ranking (CWUR), 2021-2022 rankings of the top 2000 universities, it is sad to note that only 15 universities from Africa made the list of the top 1000. Among the 15 Africa universities that made the list, no single Nigerian university, seven are from South Africa (University of Cape Town – 269th position; University of Witwatersrand – 292nd position; Stellenbosch University – 435th position; University of KwaZulu-Natal – 483rd position; University of Pretoria – 580th position; University of Johannesburg – 676th position; and North-West University – 924th position), five universities are from Egypt (Cairo University – 546th position; Ain Shams University – 797th position; Mansoura University – 984th position; and Alexandria University – 999th position), one each from Morocco (Mahammad V. University – 946th position), Uganda (Makerere University – 934th position), and Tunisia (Tunis EI Manar University – 952nd position) (CWUR, 2022). CWUR's rankings grade universities on seven factors. They are: quality of teaching, alumni employment, quality of faculty, research output, quality publications, influence, and citations. The methodology has been enhanced this year, with research now accounting for 70 per cent of the score (CWUR, 2022). This ranking together with the other factors is based on a visible institutional repository.

As libraries were struggling financially under the business model of publishing, IRs emerged as affordable alternative models of developing library collections, where a university shares “its intellectual wealth with the worldwide community of scholars, allowing all interested readers access to the discoveries and insights produced by its members” (p.4) (Vos 2015 cited Jones, Andrew & McColl, 2006). One of the major roles is that academic libraries become strong advocates of Open Access (OA) by maintaining awareness and promoting OA activities within their institution (Mercer, 2011). Despite the potential benefits associated with the development of institutional repositories (IRs) in universities, studies have shown that most universities in Nigeria have not keyed into this laudable innovation (Anenene, Alegbeleye, & Oyewole, 2017; Oguche, 2018; Bangani, 2018; Mutsvunguma, 2019; Anene, Ozor, & Baro, 2020). This could be as a result of some factors like low level of awareness and unfavorable perception of IRs on the part of the management of universities, coupled with lack of fund, and lack of policy statements on submissions and restrictions, issues of copyright and preservation. It appears that the daily research outputs from universities such as research papers, theses and dissertations, projects from Nigerian universities are not widely communicated to users and researchers all over the world. Strategic planning and development

of IRs in developing countries like Nigeria is the answer to making research output emanating from the various universities visible to readers and researchers all over the world. From the best of our Knowledge, only few studies have reported the development of open access IRs in universities in Nigeria, to fill the gap, the present study aims to investigate the current state of open access institutional repositories in Nigerian university libraries. To achieve this, the study raised the following research questions to guide the study.

1.1 Research Questions

- (1) How many university libraries in Nigeria have successfully developed institutional repositories?
- (2) What contents are used to develop the institutional repositories in Nigeria?
- (3) What software is adopted to manage the repository contents?
- (4) What type of institutional repository policies are available?
- (5) What are the challenges encountered in the development of institutional repositories?

2. Literature review

2.1 Institutional repository development in universities

It is the responsibility of every university to ensure that scholarship produced by its research community is discoverable and accessible by the highest number of people worldwide (Armstrong, 2014). Universities in Nigeria, have started to heed to 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 university in order to increase access to information resources and visibility of their institutions as a measure of prestige and recognition internationally (NUC, 2007). This is because the idea of an institutional repository is seen as a necessity for making available institution's intellectual output, thereby increasing their visibility and better performance in the ongoing web ranking of world universities in particular.

One key criterion that is used to measure the quality of a university is the quality and quantity of research output (Anenene, Alegbeleye, & Oyewole, 2017). The situation where the totality of the research output emanating from a particular university cannot be ascertained will make it very difficult to evaluate the university output and could also impede the collation and onward transmission of the researches that can benefit different segments of the society to the parties concerned. This reveals the need for the establishment or development of institutional repositories in universities to make the intellectual output visible globally. According to Grundy (2017) one of the prominent indicators for university ranking is research productivity. That is, it looks at a university's reputation for research excellence among its peers. Another important criterion is the research influence (citations). The research influence indicator looks at university's role in spreading new knowledge and ideas, i.e. the number of times a university's published work is cited by scholars globally (Grundy, 2017). For example, Shoeb, (2010) reported that the Cybermetrics Lab listed Independence University,

Bangladesh in their ranking of top 100 universities (in Bangladesh, first among all private universities, third among all universities after Bangladesh University of Engineering and Technology (BUET) and Dhaka University (DU) and 75th position on the Indian-subcontinent in their January 2009 ranking. This ranking according to Shoeb (2010), was based on research activities, visibility of the university nationally and internationally, volume of scholarly document created and published, and size and impact of its web presence. The fruits of research from the formal research programs of conventional universities and academic research institutions in Nigerian universities are under-utilized as the access to the theses and dissertations is very limited to users outside the university (Ezeani & Ezema, 2011; Baro & Otiode, 2014).

Omeluzor (2014) stated that both institutions and contributors benefit from IR. Omeluzor reported that institutions benefit from IR as it; serves as tangible indicator of an institution's quality, thus increasing its visibility, prestige, and public value; increases the ranking of an institution both at local and international level; enhances learning, online teaching and research especially in universities; and presents an institution's intellectual capital to a whole lot of scholars. Salau et al. (2019) investigated the performance of electronic theses and dissertations (ETD) initiatives in the repositories of federal government-owned universities due to the poor global visibility of ETDs from Nigeria. The authors found that the ETD initiatives in repositories of Nigerian federal universities have not made remarkable progress as digital libraries based on policy, content and system architecture. The repositories housing the ETDs are also not compliant with the open archive initiative-protocol for metadata harvesting framework.

2.2 IR policies in universities

With IR content growing rapidly, it is important to look at how policies have been developed to guide the issues like content submission, type of materials to be added to the institutional repository, digital preservation, access, and copyright issues. Concerning IR policies formulated in the university libraries, the study by Kari and Baro (2016) reported that Covenant University Website has IR policy statement such as "items will be retained indefinitely," and "Covenant University Repository will try to ensure continued readability and accessibility." Cayabyab (2015) opined that the imposition of policies played an important role in the implementation of any project, especially ETD projects. Several studies, such as Corletey (2011), Baro, Godfrey, and Eze (2014) and Baro and Otiode (2014) have reported the absence of IR policies in universities in Africa.

Policy interventions have been identified as important strategies for mandatory self-archiving. Strong open access policies have been found to have a positive effect on IR deposits (Zhang, Boock, & Wirth, 2015). Without a mandatory policy, academics' intellectual consciousness of sharing human knowledge is weak (Zhong & Jiang, 2016). Although mandates are seen as somewhat slow in recruiting content, they are an effective mechanism that ensures IR development (Tapfuma, 2016). Gul, Bashir, and Ganaie (2020) evaluated institutional repositories of South Asia and found that submission policy holds weak as only 14 (20 percent) repositories have defined their submission policies while as a huge score (56: 80 percent) of the repositories have not defined their submission policies.

2.3 Local contents used to develop IR

A university's IR is characterized by exhibiting intellectual products created by its research community. This according to (Crow, 2002; p.4) includes "theses and dissertations, articles published in scientific journals, conference proceedings, classroom teaching materials, the university's annual reports, video recordings, computer programmes, data sets, photographs, art works and 'virtually any digital material' that the institution wishes to preserve." Early implementers of IRs experimented by populating their repositories mostly with grey literature such as theses and dissertations, material which does not normally find its way into the various publication channels. Content has since diversified and the current state seems to agree with what Shearer (2004; p.4) predicted that:

In the next ten to twenty years, it is likely that the scholarly communications system will have evolved into some form of unified global archive system, without the current partitioning and access restrictions familiar from the paper medium, for the simple reason that it is the best way to communicate knowledge and hence to create new knowledge.

Local contents such as theses and dissertations, projects, course notes, seminar papers, conference proceedings, administrative documents, learning objects and other forms of grey literature from the institution could make up the holdings in institutional repositories. Singeh, Abrizah, and Karim (2013) reported that for repositories to be successful and sustainable, they must be populated with scholarly works of enduring value.

At global level, as reflected on OpenDOAR (OpenDOAR, 2022), digital materials, such as: journal articles, theses and dissertations, books and book chapters, datasets, multimedia and audio-visual material, learning objects, unpublished reports and papers, conference and workshop papers, patents, software, and bibliographic references, are being populated in IRs. Suber (2008; p.5) noted that, the goal of Open Access (OA) is "open access to peer-reviewed journal literature", which was previously inaccessible due to financial barriers. With over 71% of repositories populating journal articles (OpenDOAR, 2022), it can be deduced that OA publishing is slowly reaching a point of maturity. Several studies have found theses and dissertations as the most common content submitted to IRs in Africa (Bangani, 2018; Mutsvunguma, 2019). The study by Arlitsch et al. (2021) revealed that the Epsilon Archive for Student Projects, Massey Research Online, University of Western Cape repository electronic theses and dissertations repository, UWSpace and CaltechTHESIS are among the repositories whose content consists almost entirely of electronic theses and dissertations.

2.4 Software used to manage content in IRs

The growth of IRs was inspired by the availability of free and open source software. This rapid growth became more evident at the beginning of the 21st century when open source software enjoyed a strong uptake particularly in Europe (Shearer, 2015; p.3). Free and open source software packages allow users to freely use the software so long as they have the technical expertise needed to work

on the software. Open-source software, such as DSpace, Eprints, Fedora, Greenstone, WEKO, Digital Commons are some of the tools that have positively impacted on the growth of IRs worldwide. DSpace is the most popular OA software, constituting 44% of open source software used to develop repositories (OpenDOAR, 2022). Within the African region, 84% of repositories use the DSpace software (Mutsvunguma, 2019).

Institutions prefer DSpace because it caters for a variety of digital archiving needs ranging from IRs to learning object repositories or electronic records management and more (Suber, 2008; p.34). DSpace has been found to be user friendly (Ukwoma & Okafor, 2017; p.51). It is adaptable to different community needs, its interoperability between systems is built-in and it adheres to international standards for metadata format (Tramboo et al., 2012). Institutions find DSpace easier to implement, maintain and use, especially from the point of view of many libraries that lack specialized IT staff (Tkacikova, 2009).

2.5 Challenges associated with IR development.

In many African countries like Nigeria, the development of institutional repositories have faced serious problems ranging from low Internet connectivity; software and hardware challenges; lack of highly skilled personnel; inadequate power supply; low bandwidth; legal copyright laws; poor funding; lack of organizational infrastructure and policies; project sustainability and many others (Ezeani & Ezema, 2011; Ukwoma & Okafor, 2017). The appointment of personnel with relevant skills and the capacity to partner and work as a team are also key drivers in the establishment of IRs (Ibinaiye et al., 2015).

Another major challenge in the development of IRs is awareness and use of self-archiving options. Kim (2010) studied the motivations and barriers for author self-archiving and found that one of the significant factors influencing self-archiving behaviour among authors included technical skills. Studies have revealed that academics are reluctant to self-archive their research output without library mediation (Zhang, Boock, & Wirth, 2015; Baro, Tralagba, & Ebiagbe, 2018). Abdullah (2009) reported that authors' reluctance to self-archive their work in IRs was due to the technical difficulties in carrying out the activity. Several studies have revealed that copyright is a challenge amongst academics, for example, Abdullah (2009; p.20) found that, "with only 10% of authors knowing of the SHERPA/RoMEO list of publishers' permissions policy with respect to self-archiving, a substantial proportion of authors were unaware of the possibility of providing OA to their work". Similarly, Ware and Mabe (2015; p.77) found that "authors underestimate what they could do with pre-publication versions (e.g. self-archiving, use in course packs, provide copies to colleagues) while overestimating what publishers' policies allowed them to do with the published version". In the same vein, Cullen and Chawner (2011 cited in Bjork, 2014; p.9) found that academics believed that the copyright policies of the publishers prevented them from self-archiving. Authors, however, need to be aware that considerable work has already been done "on copyright in association with the use of repositories to enhance the OA for research outputs, especially published articles" (Abdullah, 2009; p.31). As of November 2017, the Sherpa/RoMEO database had 41% of publishers allowing archiving of both pre-print and post-print, 33% allowing only post-print or final draft, and 6%

allowing only pre-print; summing up to 80% of publishers formally allowing some form of self-archiving (SHERPA/RoMEO: RoMEO Statistics, 2017). Authors are therefore encouraged to check the OA policy of the selected journal title before considering publishing.

In South Africa, Macha, and De Jager (2011) identified various factors to be considered when setting up IRs. This included; identifying important role players, addressing issues of resources, evaluating software, formulating policies for the institutional repository, restructuring the library to accommodate change and licensing. Similarly, Dlamini and Snyman (2017) conducted a study on institutional repositories in Africa. The study identified the following major obstacles to development of IRs in African institutions. They are: inadequate funding or financial support, lack of support from institutional management and lack of awareness of IRs at institutional management level. Gbaje (2012) in his study identified limited technological skill to setup and configure IR software as one of the limitations towards the successful development of IR in Nigerian libraries. Other factors identified includes: lack of technological infrastructures such as the Internet connection and bandwidth; lack of institutional commitment and scholars' apathy (lack of adoption and use).

The development of IRs is a capital intensive project requiring functional and flexible technological infrastructure to build on. Inadequate technological infrastructure has been cited as a hindrance to OA adoption, especially in developing countries (Dulle, 2010, p.68). Unstable Internet connections, poor electricity supply, lack adequate computer equipment and appropriate software (Okhakhu, 2015), are some other major challenges that have been revealed.

3. Research Methodology

The study covered all the university libraries in Nigeria that have developed Institutional Repository. The study adopted a survey research design and data was collected in three parts: first, OpenDoar database was searched to identify universities in Nigeria that have developed IRs and are listed in the database. Secondly, online questionnaire was designed to collect data from the librarians in-charge of the IR in the university libraries in Nigeria. Thirdly, the librarian in-charge of the IR in each university library was engaged in an interview separately to elicit information concerning availability of IR policy statements formulated.

Interview questions

The two brief interview questions are:

- (1) What type of IR policy is available in your library IR?
 - is there access policy, content policy, submission policy, preservation policy, or copyright policy?
- (2) What are some of the challenges you encountered in the development of your library IR?

Berg (2007) suggests that one way of handling information analysis is by content analysis or

qualitative analysis. Berg further stressed that content should be coded under certain themes or questions being asked. In the present study, the participants were initially contacted to seek their willingness to participate in a brief interview, they all voluntarily agreed to participate. For convenience and time factor, WhatsApp chat was used to conduct the brief interview with the participants. Their WhatsApp numbers were collected and added to enable us chat separately with each of the participants. The brief interview lasted for 5 minutes with each of the librarians’ in-charge of the IR. Information collected from the interview using the WhatsApp chat were coded according to major themes that appeared frequently and arranged according to similar topics. Results of the qualitative data are presented in Figure 2 and Table 3.

4. Results and discussions

4.1 Designation of respondents

Of the 21 respondents representing the 21 IRs in university libraries in Nigeria, 8 indicated that they were institutional repository administrators, 6 indicated as systems librarians, 5 indicated as digital librarians and 2 are digital content creators.

4.2 University libraries in Nigeria that have developed IR

The OpenDoar database investigation revealed that presently, only 21 universities in Nigeria have developed IRs to manage their local contents emanating from the universities (see Table 1 for details). June 2022, there are 202 National Universities Commission (NUC) approved universities in Nigeria. A breakdown by status shows that: 49 are Federal universities, 54 are State owned universities, and 99 are privately owned universities (NUC, 2022). The study revealed that out of the 202 NUC approved universities in Nigeria, only 21 (10.4%) universities have successfully developed functional IR to preserve and manage their intellectual output emanating from their universities for global visibility. This shows that the development of IRs to manage and make intellectual output emanating from the universities visible globally is still at a slow pace considering the number of universities in the Nigeria. To this end, it has become imperative for other universities in the country to make it as a priority to invest in the development of IR in their university.

Table 1. Universities in Nigeria that have developed institutional repository

s/n	Name of University	Software type	Number of records	Site
1	Ahmadu Bello University, Zaria	DSpace	10,720	http://kubanni.abu.edu.ng/jspui
2	Afe Babalola University	EPrint	3,827	http://eprints.abuad.edu.ng/
3	Ambrose Alli University, Ekpoma	DSpace	3,444	http://154.68.224.61:8080

s/n	Name of University	Software type	Number of records	Site
4	American University of Nigeria	DSpace	5,956	http://digitallibrary.aun.edu.ng:8080/xmlui
5	Covenant University, Ota	EPrint	3,022	http://eprints.covenantuniversity.edu.ng/
6	Federal University Ndufu-Alike, Ikwo	DSpace	3,240	http://dspace.funai.edu.ng/
7	Elizade University	DSpace	4,606	http://repository.elizadeuniversity.edu.ng
8	Ebonyi State University	DSpace	101	http://ir.ebsu.edu.ng:8080/xmlui
9	Federal University of Technology, Akure	Unspecified	4,402	http://196.220.128.81:8080/xmlui
10	Federal University Dutsinma	DSpace	2,979	http://dspace.fudutsinma.edu.ng/jspui/
11	Federal University Lokoja	DSpace	2,107	http://repository.fulokoja.edu.ng/
12	Federal University Oye-Ekiti	DSpace	2,065	http://www.repository.fuoye.edu.ng/
13	Federal University of Technology, Minna	DSpace	3,613	http://dspace.futmina.edu.ng/jspui/
14	Landmark University	EPrints	4,911	http://eprints.lmu.edu.ng/
15	Nassarawa State University, Keffi	DSpace	3,440	http://keffi.nasuk.edu.ng:8080/xmlui/
16	Usmanu Danfodiyo University, Sokoto	DSpace	10,492	http://oer.udusok.edu.ng:8080/xmlui/
17	University of Ibadan	DSpace	25,981	http://ir.library.edu.ng/
18	University of Jos	DSpace	11,702	http://irepos.unijos.edu.ng/jspui
19	University of Lagos	DSpace	9,094	https://ir.unilag.edu.ng/
20	University of Ilorin	DSpace	78	http://uilspace.unilorin.edu.ng:8080/jspui
21	University of Nigeria, Nsukka	DSpace	24,242	http://unn.edu.ng/chart/repo http://www.repository.unn.edu.ng

4.3 Type of content used to develop IRs in Nigeria

From the literature review, the most common content types were listed as the major content type and a check list was used against each IR to check if such item is hosted in the repository or not.

The various IRs investigation shows that, among the various contents used to develop IRs in universities in Nigeria, journal articles was the most popular content available in all the 21 (100%) IRs, followed by theses/dissertations hosted in 20 (95.2%) IRs, and conference/workshop papers hosted in 17 (81.0%) IRs. The least popular contents are video/images hosted in only 6 (28.8%) IRs, and inaugural lectures hosted in only 8 (38.1%) IRs (Table 2). This finding is consistent with the findings of Chisita and Chiparusha's (2020) study which revealed that the most popular contents in Zimbabwean institutional repositories are peer-reviewed articles, conference proceedings, theses and dissertations. Bangani (2018) found that institutional repositories in public universities in South Africa mostly contain electronic theses and dissertations, while journal articles and conference proceed-

ings are increasing in number.



Table 2. Type of content used to develop IRs in Nigeria

s/n	Name of University	Journal articles	Books, chapters in Books	Theses/ dissertations	Conference/ workshop papers	video/ images	Inaugural lectures	Learning objects/ past question papers	Artefacts
1	Ahmadu Bello University, Zaria	√	√	√	√	X	√	X	√
2	Afe Babalola University	√	√	√	√	√	X	√	√
3	Ambrose Alli University, Ekpoma	√	X	√	√	X	X	X	X
4	American University of Nigeria	√	√	√	X	X	X	X	√
5	Covenant University, Ota	√	√	√	√	√	X	X	√
6	Federal University Ndufu-Alike, Ikwo	√	X	√	√	X	X	X	X
7	Elizade University	√	√	√	X	√	√	X	X
8	Ebonyi State University	√	√	√	√	X	√	X	X
9	Federal University of Technology, Akure	√	X	√	X	X	√	√	X
10	Federal University Dutsinma	√	√	√	√	X	X	√	X
11	Federal University Lokoja	√	√	√	√	X	X	X	X
12	Federal University Oye-Ekiti	√	X	X	√	X	X	√	√
13	Federal University of Technology, Minna	√	X	√	√	X	√	√	X
14	Landmark University	√	X	√	√	√	√	X	√
15	Nassarawa State University, Keffi	√	√	√	√	X	X	√	X
16	Usman Danfodiyo University, Sokoto	√	√	√	√	X	X	X	X
17	University of Ibadan	√	√	√	√	X	√	√	X
18	University of Jos	√	X	√	√	√	X	√	√
19	University of Lagos	√	X	√	√	√	√	√	√
20	University of Ilorin	√		√					
21	University of Nigeria, Nsukka	√	√	√	√	X	X	X	X

4.4 Software used to manage content in the IRs in Nigeria.

Results in Figure 1 shows that, out of the 21 institutional repositories investigated (see details in Table 1), 17 (81.0%) used DSpace to manage their contents in their institutional repository, 3 (14.3%) used EPrint. While, 1 (4.7%) repository did not specify the type of software used. The results show that DSpace was widely used by a majority of the universities in Nigeria to manage digital contents in their institutional repositories. The findings agree with previous studies like that of Chisita and Chiparausha (2020) the free and open source software like DSpace is widely used in universities in Zimbabwe to manage digital resources held in institutional repositories.

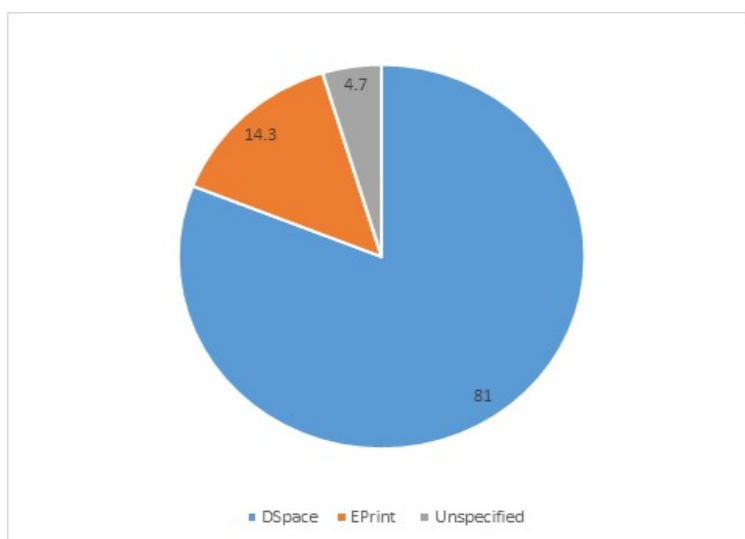


Fig. 1. IR software used

4.5 Type of IR policy available

To know the type of IR policies available in each of the IRs investigated, the librarians in-charge of the institutional repositories were asked to mention the type of IR policies (Access policy, content policy, submission policy, preservation policy, and copyright policy) available in their IR. These major policy areas were taken from the literature on IR policies.

Some of the respondents mentioned two to three IR policy areas available in their IR as presented in Figure 2. The results show that, 6 (28.6%) responding institutions mentioned having access policy statement in their IR, 6 (28.6%) also mentioned having submission policy available in their IR, 5 (23.8%) mentioned having preservation policy in their IR, and 4 (19.0%) mentioned having content policy, 3 (14.3%) mentioned having copyright policy, and the majority (15: 71.4%) of the responding institutions mentioned not having any defined IR policy. This shows that many institutional repositories in Nigeria are developed without consideration of formulating policy statements to guide their development. This finding is consistent with the literature as many studies have identified lack

of IR policy statements in IRs in developing countries (Kari & Baro, 2016; Bangani, 2018; Salau et al., 2020, Anene et al., 2020). As contents of institutional repositories are growing rapidly, it has become imperative to look at how policies have been developed to guide issues such as content submission, the type of material to be added to the institutional repository, and copyright issues.

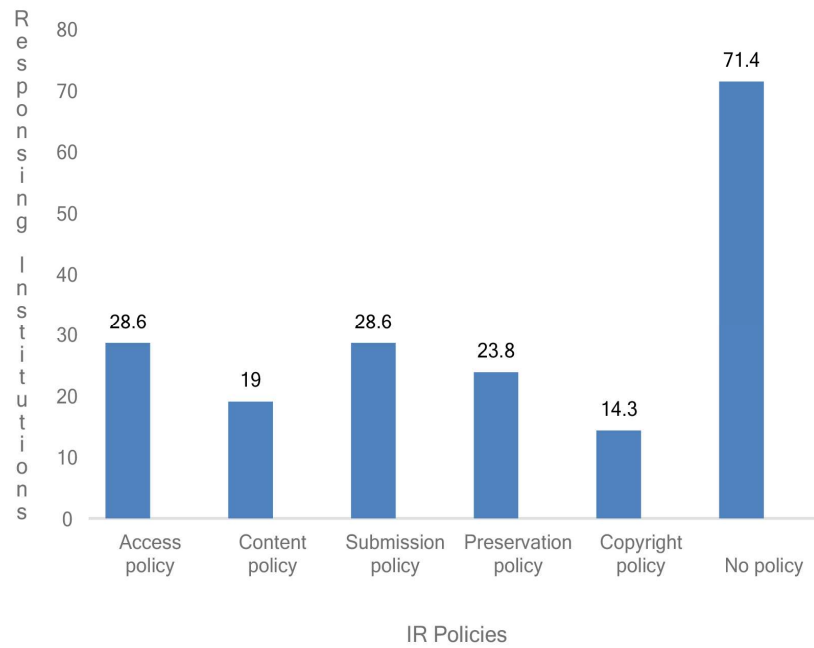


Fig. 2. IR policies available

5. Challenges encountered in the development of institutional repositories

To collect data on the challenges encountered in the development of IR, the various participants were asked to mention the challenges they encountered in the development of their IR. This was done through the WhatsApp chat separately with each of the librarians in-charge of the IR. The responses were analyzed according to similar topics and later ranked according to the most mentioned.

5.1 Inadequate fund

Inadequate fund was the most mentioned challenge. It was mentioned by almost all (19: 90.5%) the respondents. This finding is in line with the existing literature, especially the publications of Anyaoku, Nwabueze-Echedom, and Baro (2019), Gbaje (2012), Sadiku, Kpakiko, and Tsafe (2018). The development of IR requires huge capital investment, therefore, any university library that would develop its IR must devote huge sum of money for information and communication infrastructure. Unfortunately, most developing countries particularly in Nigeria are associated with poor ICT develop-

ment due to lack of fund. Funding is an essential element to maintain an IR. Since most of the facilities for IR are capital intensive, adequate budgetary allocation is needed to maintain it.

5.2 Challenge of collecting contents for the IR

Challenge of collecting contents for the IR was second most mentioned challenges by the respondents. It was mentioned by 15 (71.4%) respondents out of the 21. Collecting contents such as electronic theses, dissertations and journal articles from authors is a major challenge to building institutional repositories in Africa (Dlamini & Snyman, 2017; Omeluzor, 2014; Anene, Ozor, & Baro, 2020). For example, if the submission of electronic theses and dissertations is not made mandatory, Master's and PhD students will not want to submit their work for the purpose of developing institutional repositories for fear that online access to their full-text theses will increase the chances of misuse of their research. Faculty members also need to be enlightened and encouraged to submit their journal articles to build institutional repositories. Previous study by Omeluzor, (2014) revealed that 88% and 96% of the respondents from private and public universities in Nigeria have not deposited any publication in IR. The researcher, therefore, recommend that awareness of IR in institutions of higher learning must be prioritized and that faculty staff should be encouraged to contribute to IR project as a means of increasing their relevance, visibility and ranking and that of their affiliated university. Depositing a paper in the institutional repository is another way of increasing paper's visibility (Tate, 2010).

5.3 Inadequate facilities

Inadequate facilities was the third most mentioned challenge by the respondents in developing IR in Nigeria. It was mentioned by 14 (66.7%) out of the 21 respondents. This shows that facilities such as hardware, software, Internet facilities are very vital considerations in the development of IR. Studies by Ezema (2011), and Chalabi and Dahmane (2011) agree that the availability of adequate technological infrastructure is critical; its lack results in failure and has been found to be one of the major obstacles in development of IRs in developing countries. For example, Sadiku, Kpakiko, and Tsafe (2018) reported on the issues around building and sustaining an institutional digital repository and its corresponding challenges to global visibility in Nigeria. They argued that building and sustaining an institutional digital repository project requires the state-of-the-art technological infrastructure, skilled manpower, and strong financial backing including ICT skilled user community. For those universities in developing countries that are likely to champion the development of an institutional repository, a significant percentage of their budget should be devoted to ICT facilities.

5.4 Shortage of skilled ICT personnel

In the present study, shortage of skilled ICT personnel was the fourth most mentioned challenge in the development of IR. It was mentioned by 11 (52.4%) out of the 21 respondents. One of the major challenges facing development of IR in Nigeria has been the readiness of academic libraries

in terms of skills and knowledge to implementing IRs. This finding agrees with the findings of Anyaoku, Nwabueze-Echedom, and Baro (2019), who report that more than half (12, 52.2%) of the responding institutions in their study indicated that their institutional repository lacked the necessary technical staff with the required skills to handle and manage the institutional repository. In the same vein, Gbaje (2012) in his study identified limited technological skill to setup and configure IR software as one of the limitations towards the successful development of IR in Nigerian libraries. Other factors identified includes: lack of technological infrastructures such as the Internet connection and bandwidth; lack of institutional commitment and scholars' apathy (lack of adoption and use). The respondents in Anyaoku, Nwabueze-Echedom, and Baro (2019)'s study took time to write comments on the problems encountered in the development and maintenance of IRs. They mentioned issues such as: Dedicated staff are needed to manage the IR; None of the repository staff are professionals, they are on the job training; shortage of staff to maintain and manage IR, only one person is responsible for everything; lack of expertise in DSpace for development and problems encountered; shortage of staff to conduct the digitization activities; lack of expertise skills from the librarian to troubleshoot technical problem.

5.5 Absence of IR policies

Absence of IR policies was the fifth most mentioned challenge in development of IR. It was mentioned by 9 (42.9%) out of the 21 respondents. The result shows that absence of IR policies is a major challenge to implementation and management of IRs. This finding agrees with the recent findings by Salau et al. (2020) that there was no specific policy for the management of electronic theses and dissertations in Nigerian library repositories. Cayabyab (2015) opined that the imposition of policies played an important role in the implementation of any project, especially ETD projects. Several studies, such as Corletey (2011), Baro, Godfrey, and Eze (2014) and Baro and Otiode (2014) have reported absence of policies legalizing the repositories or ETD initiatives in selected universities in Africa. Therefore, the formulation of IR policies on areas such as content submission, type of materials to be added to the institutional repository, digital preservation, and copyright issues is necessary for the development and management of IRs.

5.6 Copyright issues

Copyright issues is one of the major considerations in development of IRs. In the present study, it is the sixth most mentioned challenge in the development of IRs (Table 3). It was mentioned by 5 (23.8%) out of the 21 respondents. The principle of fair use recognizes the lawful use of copyrighted work without deeming it an infringement, notwithstanding that the copyright holder has not authorized such use (Chuma-Okoro, 2010). Repositories require that legal issues bordering on copyright be cleared. According to Koulouris et al. (2013), copyright issues were to be dealt with using SHERPA/ROMEO, along with the help of the institute's legal department. The decision to provide a copyright clearance through the institutional repositories solved many issues related to contend depositing.

Table 3. Challenges encountered in the development of IRs

IR development Challenges	Frequency of responses	Percentage	Rank order
Inadequate fund	19	90.5%	1 st
Challenge of collecting contents for the IR	15	71.4%	2 nd
Inadequate facilities	14	66.7%	3 rd
Shortage of skilled ICT personnel	11	52.4%	4 th
Absence of IR policies	9	42.9%	5 th
Copyright issues	5	23.8%	6 th

6. Conclusion

Based on the findings, the study revealed that only few universities have successfully developed open access IR to preserve and manage their intellectual outputs emanating from their universities for global visibility. The various IRs investigated revealed contents such as journal articles, theses/dissertations, and conference/workshop papers as the most popular contents hosted in the IRs. DSpace appeared to be the most adopted software to manage contents in the IRs. The interview revealed that although few respondents mentioned having IR policy statements in areas such as access policy, submission policy, preservation policy content policy and copyright policy, the majority mentioned not having any defined policy in their IR. It also emerged that inadequate fund, challenge of collecting contents for the IR, shortage of skilled ICT personnel, and inadequate facilities were the most mentioned challenges they encountered in development of IRs in Nigeria.

The study recommends that as universities identify broader solutions to the collection visibility and measurement of research, university libraries should also identify new ways such as developing IRs to support the aims of their universities. To this end, other universities that have not keyed into this new innovation should embrace IR as an option for increasing the visibility of their local contents, status and researchers' relevance in the knowledge world.

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[About the author]

Idiedo, Victor Okeoghene holds Masters in Library and Information Science from Delta State University Abraka in Delta State and Ph.D also in Library and Information Science from Nnamdi Azikiwe University, Awka in Anambra State all in Nigeria. He has published 15 papers in local and international journals in librarianship. He is a Certified Librarian of Nigeria (CLN). He worked in Niger Delta University, Amassoma, Bayelsa State for about 8 years. Presently, he is the pioneer University Librarian Bayelsa Medical University, Yenagoa in Bayelsa State, Nigeria. He can be contacted on E-mail: evergreenvictor@yahoo.com

Omigie, Christopher Agbeniaru holds Masters in Library and information Science from Delta State University Abraka in Delta State and Ph.D also in Library and Information Science from Nnamdi Azikiwe University, Awka in Anambra State all in Nigeria. He has published 25 papers in both local and international journals in librarianship. He is a Certified Librarian of Nigeria (CLN). He is presently working as Lecturer 1 and Acting Head of Department of Library

and Information Science, Ambrose Alli University, Ekpoma, Edo State, Nigeria. He is the assistant managing editor of *Communicate: Journal of Library and Information Science*. He can be contacted on E-mail: Cvchris72@gmail.com

Ebhomeye, Loveth is currently pursuing her Masters in Library and Information Science at Ignatius Ajuru University of Education, Port-Harcourt, River State, Nigeria. She has published 8 papers in local and international journals and 1 book chapter in *Librarianship*. She is a Certified Librarian of Nigeria (CLN). She presently works as Assistant Librarian and Head of the Law Library, Niger Delta University, Amassoma, Bayelsa State, Nigeria. she can be contacted on E-mail: ekeata@yahoo.com
