Qualitative and Quantitative Methods in Libraries (QQML) 12,4:561-577, 2023

Decisive Indicators for the Implementation of Sustainable Institutional Repositories: An Exploratory Study

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Abstract

Institutional Repositories (IRs) recorded a remarkable impact on scholarly communication, knowledge creation, and research sharing. Continuing the impact of IRs within the socio-political, financial, and technological changes requires building an integrated and sustainable eco-system. Sustainable IRs entails implementing deliberate strategies to ensure the practice thrive over time. These strategies involve stakeholders' engagement, adherence to international standards, developing effective policies, establishing collaborative partnerships among others. However, implementing sustainability strategies requires proper identification of sustainability indicators. This paper attempted to explore indicators for sustainable IRs. The paper adopted a descriptive qualitative approach to investigate indicators of IRs sustainability in the Nigerian context. A Semi-structured interview was used as an instrument for data collection supported by group discussion. The analysis of the interview responses revealed forty-four (44) indicators responsible for the implementation of sustainable IRs. The indicators were thematically grouped across nine categories. These indicators were empirically meant to gauge and enhance the sustainability of IRs practice from different perspectives. This paper provides a basis for understanding IRs sustainability. The results shall serve as a guide for the implementation of sustainable IRs within academic institutions. The paper is designed to help IRs managers, library administrators and, other IRs practitioners identify areas that are critical for the implementation of sustainable IRs.

Keywords:
Sustainable IRs, IRs Sustainability indicators, Lasting the impact of IRs, Qualitative evidence.

Received: 25.7.2023 Accepted: 13.12.2023 ISSN 2241-1925

Introduction

Technological development introduces issues that are threatening the continuity of many projects in various fields, IRs are not exclusive. Technology imposed numerous concerns that hinder the smooth implementation and sustainable running of IRs globally (Asadi, Abdullah, Yah, & Nazir, 2019). While the fear of these challenges discourages many institutions to start the repository project, several institutions have abandoned their project after reaching a certain stage as a result of inability to overcome the challenges faced. For instance, Nigeria has over 191 universities, apart from Polytechnics and colleges of education, but only 30 repositories were visible from these institutions. Out of the 30 only 16 repositories were detected running 24/7 (OpenDOAR,2020). Literature attributed the low implementation and feeble management of IRs to numerous reasons, including governmental support, policies, preservation, copyright issues, skills, and competencies of the stakeholders among others (Adam & Kiran, 2019; Anene & Baro, 2020; Oguche, 2018). Since the challenges are emanating from different dimensions, identifying indicators become critical for gauging the sustainability and ascertaining sustainable IR practice. From the repositories perspective, sustainability entails long-term performance of the repository from technical, socioeconomic, policy, and cultural dimensions and encompasses the concept of stewardship and the responsible management of the resources, (Rieger, 2012). Similarly, Erway (2012) defined sustainability as "the ability to keep an already successful repository running into the future". Therefore, a sustainability study involves either identifying indicators or assessing the level of the implementation of the indicators.

Sustainability indicators qualify and explain the phenomena to help in understanding complex situation or system. The primary purpose behind the identification of indicators is to assess, gauge, and determine sustainability. Indicators need to be developed in a manageable set that represents reality, for easy identification and analysis of the situation. The indicators may come as a result of trying to maintain the desired performance while struggling to overcome the challenges of the management of the project, which is the essence of sustainability assessment (Meadows, 1998). This paper aims at overcoming the barriers to the establishment of sustainable IRs by exploring and harmonizing indicators for the sustainability of IRs in the Nigerian context.

Brief about Nigeria

Nigeria is the largest country in Africa and the seventh most populous country in the world after China, India, the USA, Indonesia, Pakistan, and Brazil, with a total population of 206 million people, constituting 2.64 % of the world population. Nigeria has a federal system of government comprising 744 local governments across 36 states including the Federal Capital Territory (FCT), Abuja. Geographically, Nigeria is situated in the West African region having borders with Benin from the west, Cameroon, and Chad from the east, and Niger from the north. Similarly, Nigeria has a compact area of 923,768 square kilometers. On the other hand, Nigeria has more than 250 different

ethnic groups, the three major languages are Hausa, Yoruba, and Igbo. Nigeria is politically delineated into six geo-political zones i.e., North-East, North-Central, North-West, South-East, South-West, and South South (Agbu & Mishra, 2017; Nations United, 2017; Oguche, 2018; Worldometers, 2021).

Nigeria has the largest tertiary education system in Sub-Saharan Africa. The system is structured into four categories; universities, colleges of education, polytechnics, and allied institutes involving numerous academic and professional programs that attached scholars and students all over the globe. Currently, the system encompasses 191 federal, state, and private approved universities, 89 federal, state, and private colleges of education, 188 federal, state, and private polytechnics, and over 201 allied technical institutions across the 744 local government areas of the federation. Admission into tertiary institutions is regulated by Joint Admissions and Matriculation Board (JAMB) through the conduct of a compulsory examination known as the Unified Tertiary Matriculation Examination (UTME). The UTME is considered as an entry requirement for attending higher education institutions in Nigeria. This system represents the country's research capacity and produces most of its skilled professionals (Federal Ministry of Education, 2021; Nationa Board for Technical Education, 2020; National Universities Commission, 2021; Saint, Hartnett, & Strassner, 2003).

Nigerian University system is a three tiers system that comprises federal, state, and private universities. With the National Universities Commission (NUC) as a regulatory body, the system has undergone tremendous development with an unprecedented rate of growth over several decades. From the initial enrolment of 3,646 students in 1962, the system recorded an enrolment of 1.7 million undergraduate students and 234 thousand postgraduate students in 2017. As of 2020, the system housed 44 federal, 48 states, and 99 private universities which were officially approved by the commission (Adesola, 1991; Famurewa, 2014; National Universities Commission, 2021; Statista, 2021).

The widespread implementation of open access has attracted the attention of universities worldwide. Like many university systems, the Nigerian university system is involved and becomes an active player in the open access movement. In 2017 the system validated the draft of the Open Education Resources (OER) policy and launched Nigerian University System Open Education Resources (NUSOER). The NUSOER was meant to serve as a national repository for all OERs held by universities in Nigeria. Similarly, the NUC directed that all universities should be ranked by the strength of their OERs. Subsequently, the universities were encouraged to host full-text conference papers, non-copyrighted books, lecture notes, journal articles, reports, theses, and dissertations, videos of lectures, courseware, and other varieties of OER on their websites (Agbu & Mishra, 2017; Zaid & Alabi, 2020).

Literature Review

The term sustainable formed the basis concept that incorporates the idea of sustainability, sustainable development and concerns with the future of natural resources and human life (Feil & Schreiber, 2017). It is however derived from several meanings that arose from different perspectives of researchers. These meanings emerged from: (i) Biology - meant for protection of natural resources against misuse and exploitation; (ii) Ecology - allied with preservation of individual species in ecosystems subjected human intervention; (iii) Economy - aimed at economic growth without compromising natural resources; and (iv) Sociology - for development of society while maintaining the social relations (Ciegis, Ramanauskiene, & Martinkus, 2009; Gatto, 1995; Mebratu, 1998; Paehlke, 2005). On the other hand, the term sustainability originated from the German "Nachhaltig", French "durabilite" and Dutch "duurzaam" as expressions for longevity, durability and sustainable respectively (Höfer, 2009). It was first included in the dictionary of English language in 1987 (Lutz Newton & Freyfogle, 2005). Sustainability is viewed as; *"The condition or quality of something that can be sustain, defend, maintain or conserve something else"* (Ferreira, 2010).

Therefore, Sustainability includes the union of environmental, economic and social aspects simultaneously and in mutual balance (Dempsey, Bramley, Power, & Brown, 2011), as well as with the quality of global human environmental system and requires evaluation of indicators and indexes (Singh, Murty, Gupta, & Dikshit, 2012). In conclusion, the main aim of sustainability is to ensure long term performance. The concept of sustainable is integrated with technical, financial, social and strategic skills for the achievement of desire sustainability of any system (Waheed, 2011).

Although, the concept of sustainability has not been adequately explored within the mainstream of information science (Chowdhury, 2012), sustainable information has been viewed in line with the principles of sustainable development as resources that balances the integration of social, economic, and environmental sustainability for the achievement of social transformation (Nolin, 2010). The purpose of economic sustainability of digital information system is to secure free, effective and better access to information. The success of this purpose can be measured directly through reduction of the cost, or indirectly through time and efforts save for access. While the purpose of social sustainability of digital information system is to ascertain equal access for the achievement of knowledgeable and healthier society. This purpose can be identified by the use and impact of the information. Furthermore, the purpose of environmental sustainability of digital information system is to identify safety measure that will guarantee reductions of environmental impact of digital information, this can be established in the reduction of greenhouse gas (GHG) emissions throughout the lifecycle of digital information services (Chowdhury 2013).

Scholars attempted to define sustainability in terms of IRs from different perspectives. Rieger (2011) viewed sustainability of IRs as the ability

to ensure access to all resources needed for the preservation, management, development and enhancement of the value of content and services offered, sustainability is more than mere successful implementation and content management of IRs, its requires a socio-technical approach, where the value of scholarship is realized and aligned with technical and financial support for adequate knowledge management and sharing. Van Wyk (2012) stated that, establishing Sustainable IR is not just the matter of finding efficient fund, but it is about founding sound technical, financial, legal and institutional knowledge across the stakeholders as well as forming resilient ICT infrastructure. Anbu (2006) indicated that, sustainability of IRs must include long-term preservation and management of repository content and services.

Erway (2012) defined sustainability *as "The ability to keep an already successful repository running into the future"*. And added that, *"Sustainability in this case does not take into account past costs or return on investment"*. Palmer, Teffeau, and Newton (2008) Suggested that sustainability of IRs can be achieved through attraction of high user participation, sound policy and stakeholder's engagement. Similarly, Carr and Brody (2007), urged that, sustainable repositories can be achieve through a sustainable content deposit and the key to sustained deposits is community engagement. While Li et al. (2011) viewed increasing utilization of IR content as key to building sustainable IRs. Therefore, Sustainable IRs is the repository that maintain long term performance and best practices from technical, socioeconomic, cultural, governance, policies and industrial dimensions and in cooperate stewardship and responsible management of the resources (Rieger, 2012).

The objective of this study is to explore indicators for the implementation of sustainable IRs. The question designed to achieve this objective was (1) What are the indicators for the implementation of sustainable IRs in the Nigerian Context?

Method

The paper adopted a descriptive qualitative approach to explore indicators in the Nigerian context. University of Jos from north central, Ahmadu Bello University, Zaria (ABU-Zaria) from north west, university of Nigeria Nsukka (UUN) from south east, university of Ibadan (Uni Ibadan) from south west of Nigeria were purposely selected for this study. These universities were selected for the following reasons:

i. They are among the first-generation, prestigious and highly ranked universities.
ii. Among the pioneer of IR practice in the country.
iii. They also exhibited a strong commitment toward the management of IR and maintain a keen interest in providing access to scholarly output produced by scholars in their respective communities.
iv. They maintained functioning IR with reasonable amount of content relatively (Adam & Kaur, 2019; Oguche, 2018; OPENDOAR, 2019).

A semi-structured interview was used as the main instrument for data collection supported with group discussion. Purposive sampling technique was used in selecting 11 experienced staff on IR and scholarly communication among librarians working at the IR unit and scholars knowledgeable about IRs practices in these universities. The reason behind the purposive selection of these respondents is because they are the right stakeholders who can feed the researcher with empirical information that will enable him to understand and explore the actual threats of IRs practice as well as identify the indicators of sustainable IRs.

Findings and Discussion

The data were thoroughly checked, abstracted, simplified into meaningful data, analyzed, organized into themes and sub-themes as they emerged from responses of the participants. The analysis was reported using (Clarke & Braun, 2013) thematic analysis phases. The result is hereby presented as follows:

Demographic Data

The data were collected through a semi-structured interview, which was transcribed, coded, organized, analyzed, and presented. The data was collected from eleven (11) experienced scholars including librarians, IT staff, and researchers. The majority of the participant are researchers and IRs management team at the same time. Specifically, 72.72.% of participants were librarians working as head of libraries, repository managers, repository staff and, researchers on IRs, 27.27% were system administrators. While 18.18 % of the participants were female, 81.81% were male. Similarly, 64.63 % were Ph.D. holders and, 36.36 % have master's degrees. As the working experience of the participants ranges from 8 to 46 years, the meeting lasts from 15 to 50 minutes and the interview process produced 16,172 transcribed words. Table 4.1 presents a summary of the interview

Table 1: Summary of the interview demographic data

Participants	Institution	Code	Gender	Qualification	Experience
Librarian	[A]	PA1	Male	PhD	14
Repository Manager		PA2	Male	MLS	8
System Administrator		PA3	Male	MSC	12
Librarian	[J]	PJ1	Male	PhD	46
Repository Manager		PJ2	Male	Masters	8
Repository Manager	[I]	PI1	Male	PhD	14
Repository Librarian		PI2	Male	PhD	35
Systems Administrator		UI3	Male	PhD	12
Librarian	[N]	PN1	Male	PhD	20
Systems Administrator		PN2	Female	MSC	10

Repository Manager		PN3	Female	PhD	14

J = University of Jos North Central
I = University of Ibadan South West
N = University of Nigeria South East

Forty-four indicators were emerged from the analysis of responses of the interview participants. The indicators were thematically grouped into nine categories. The categories are hereby presented and discussed as follows:

Collaborative Stakeholders' Engagement

The analysis of the interview responses discovered that creating teamwork and collegial engagement internally between the repository management team, research students, and scholars as well as establishing effective collaboration externally with other institutions, agencies, and organizations for resource sharing and expertise are among the basic requirements for the implementation of sustainable IRs in the Nigerian context. This was supported empirically by the participants as they were able to sustain the practice through stakeholders' engagement and external collaboration for over a decade (PJ1). This finding implies that human engagement plays a critical role in the long-term stewardship of IRs practice. In other words, resources and expertise sharing reduces the cost and subsequently aid sustainability. Literature acknowledged the importance of stakeholders' engagement for enhancing the sustainability of data provisioning in the library and information science (Doerr, FORTH-ICS, de Jong, & Delving, 2014). he finding is also indicated by the assertion of Downs and Chen (2010) that collaboration within and between institutions is a feasible option for long-term stewardship of digital repository. Therefore, these findings are vindicated, and the explored indicators are extremely needed for IRs to be sustainable.

> *"Collaborating between the faculty members, librarians, library management, and even with National University Commission (NUC) at the apex level is of paramount importance. we need to put our hands together in terms of resources, expertise, and whatever so that we achieve our objectives concerning ensuring the sustainability of IR for managing and showcasing our local output"* PN1
>
> *"Collaboration is one of the key indicators for the sustainable running of IR. we need to invite the issue of collaboration both internally and externally. Even though, within our setup, it uses to be very difficult because we lacked the habit of collaborating with one another to toward achieving a specific target"* PA2.

Competent IR Community

The result of the interview indicated that the readiness of the repository team and scholars in terms of skills necessary for production and management of the scholarly publications and regular training for developing competent IRs community are essential for the sustainability of IRs practice in Nigeria. This

finding implies that IRs being a form of scholarly communication within the institution requires prerequisites competencies for both the librarians and scholars to be able to effectively manage the repository project (Wesolek et al., 2017). Similarly, for the repository to be sustained, the IR management community need regular training and updates on the current practices. According to the participants, regular training is necessary because the practice is suffering from the inadequate skills of some IRs team members and scholars in many institutions in the country.

> *"I will emphasize more on the training, most of the universities that started the IRs do not take the issue of training very seriously. If we want to sustain the IRs project and compete with universities outside the world, we should make sure our personnel get adequate and regular training on how to manage IR. There are so many innovations coming up on IRs. If our staff can be UpToDate on these issues the practice can go a long way"* PA3.

> *"Another is the issue of expertise, we need to expose our people to intensify training. As we speak, there is a big percentage of people particularly academics who yet do not how to make good use of this development. The moment academics are exposed to rigorous training, the repository can be sustained in Nigeria"* PI2.

Effective Content Development Strategies

Sustainable content deposit is evidence of building a sustainable repository (Carr & Brody, 2007). Populating a repository with an adequate amount of content remains the aspiration of many institutions. In Nigeria, the main method of content recruitment is mediated depositing. whereby a researcher has to submit a digital or hard copy of his paper to the library and a librarian will upload the paper on his behalf. The interview participants attributed the slow growth of the repository content to this issue and suggested the adoption of multiple recruitment methods, application of the policy for content development, recruitment of different types of resources, sharing content on open access mode, and provision of accurate metadata description as requirements for the sustainability of the practice from the content development perspective. Considering the state of IRs in Nigeria, the findings imply that, sustainable implementation of IRs is more likely determined by the application of content development policy, recruitment of diverse types of content, adoption of multiple content recruitment methods among others. This finding corroborated the assertion of Anene and Baro (2020) that for IRs to thrive and sustain there must be a collection development policy to guide their implementation. Similarly, supports the recent finding of Onyebinama, Anunobi, and Onyebinama (2021) hat increased means of the content deposit will sustain the repository.

> *"The different and quality resources, the grey resources, the special resources that you have that are visible on IRs and make people want*

> *to use your resources will give more credibility to your institution and is actually what is sustaining the practice"* PI1.
>
> *"We opened an email and asked the staff of the university to send their papers there. But for theses and dissertations any defended thesis or dissertation a copy must be submitted to the library"* PN2.
>
> *"All you need is to submit your CD that contained the article if they are born digital if they are not digital, they will scan for you free, after digitization, they then upload into the repository that is how we were able to maintain the practice"* PI1.

Innovative Technology

On the other hand, the responses from the interview participants unveiled that, it is not only installing a sustainable repository platform or reliable hardware tools and adequate network connection but also establishing stable energy supply are required for the implementation of sustainable IRs in the Nigerian context. The cost of the internet connection and instability of the electricity supply in Nigeria renders many IT projects not sustainable. For this reason, participants emphasized the establishment of adequate internet connectivity and a stable power supply as requirements for the implementation of sustainable IRs. Literature extensively discussed the role of technology and the importance of adoption of a standard software platform for the sustainability of archive and digital repositories (Chisita & Chiparausha, 2020; Eschenfelder et al., 2019; Rieger, 2012; Zargaryan, Landoy, & Repanovici, 2020).

> *"sustainability will also require the provision of hardware, like scanners, desktop computers, and all the accessories they need to be upgraded from time to time Similarly, the software the various. the version needs to be followed such that you are not operating with low grade or an obsolete version of the software. different people use different software when you begin to build a consortium or a national repository the integration will be seamless if you were able to improve on your version and use adequate software. that why there is a need for technical expertise to run and sustain the project"* PJ1.
>
> *"First, network issue I mean the internet should be looking into it when sustainability is in discuss because is the backbone of the service" PJ2.*
>
> *"power supply among the issues that need be guaranteed before sustainability is assured. As Nigerians, we have the challenges of power supply in the country. Some time you relayed on the generator. The generator will break down and there is no fund to purchase gas" PN1.*

Operative Institutional Support

Similarly, development and enforcement of policies for the management of the repository, financial, and other administrative support by the institution were suggested as the basics for the implementation of sustainable IRs by the respondents. This suggestion comes as a result of the pathetic situation of IRs practice in some institutions. Whereby the institutions offered no support for the management of IRs which allowed the service to crumble. This agreed with the assertion of literature that, policies, funding, and support have implications on the prospects and sustainability of the entire repository project. The content of the policies differs based on the context of the institution (Adam & Kiran, 2021;Masenya & Ngulube, 2020; Riddle, 2015; Ukwoma, Osadebe, & Dim, 2019). According to Chowdhury (2014) provision of the resources by the institution in form of staff salary, funds for research, and management of digital libraries is the essential facilitator for the sustainability of digital libraries. Therefore, the finding emphasizes that sustainability of IRs should emanate from the policies, financial and administrative support provided by the institution.

> "*There should be a policy. You will find out some of the universities that have already created IRs may not have the policy that is guiding the process. Once there is no policy, sustainability will not be there. Any change of administration could affect it. In some of the universities that have already created the repository, once they have a university librarian who does not have an interest in it, he will stop it, the same applies to the vice-chancellor if the vice-chancellor does not know about the repository the service may be down. But if there are policies guideline the process in the system anybody come in will stick to the policy. Another way of creating sustainability is creating a mandate. The university should make a mandate like once you do not have your paper in the repository you cannot submit that paper for appraisal during the promotion exercise. When you have such a mandate, you will not have an issue with people who are reluctant to submit their publication,* PN1.

> *"Another very important issue is the support of the management of the institution, thank God our institution is positive, the management of other institution are not supportive because they lack adequate knowledge about the role and the importance of IR. As the result, they are acting against it, which is not supposed to be*, PI2.

Governmental Regulatory Support

According to the respondents, the importance of governmental regulatory support in sustaining IRs practice cannot be over-emphasized. Support in form of establishment of national open-access policies for the implementation of IRs, funding of research, compliance with research funders guidelines, and also support from individuals and associations are necessary for

the implementation of sustainable IRs. This agreed with the assertion of literature that policies have implications on the prospects and sustainability of the entire repository project (Riddle, 2015). The finding implies that sustainability can be easily achieved through adequate regulation and support from the government, research funders, and individual scholars (Chowdhury, 2014).

> "*The practice can only be sustained if the government invests in the project. Once the federal government establishes policy and compelled people to that, I think we are going to make sustainable IRs projects*" PA3.

> "*It is a fact that the library cannot survive without IRs in this era. Whether the library wants or not they have to focus on that area. To answer your question: researches should continue to carry out. We should talk about it at various LIS forums. National Library of Nigeria, (NLA), Librarians' Registration Council of Nigeria, (LRCN), and individual scholars have a role to play in promoting IR",* PI1.

Enhance Visibility and Feedback System

Similarly, application of open access standards schema, metrics and altmetric counts, author profiling system, file optimization and identifiers, dissemination in social media, and open access finding tools for enhancing the visibility and assessing the impact of repository service were identified as indicators for the implementation of sustainable IRs. With metrics, authors and institutions can track citations and other indicators of use and impact of their publications. This represents the encouraging point for IRs practice globally. Feedback has been inseparable components of IRs without which many scholars will not have joined the practice. Today, IRs can only be sustained if it is integrated with the current development in metrics and altimetric counts for research impact assessment (Eschenfelder et al., 2019; Muscanell & Utz, 2017).

> *The profile will help, the reason why I say it will help is that I am aware of some of our researcher who has published papers and deposit it in the repository because their email is attached, they have invited to attend conferences, they have invited to join some organizations, they have been invited to be editors and join some further researchers. So that is just an email, if the profile is attached and research interests are listed, I think it will further help in interacting with publishers and researchers so that research can continue, and high level of research can be undertaken, and visibility will be obvious anyway. Profiling is something that we must include for the sustainability of IRs, despite that we have the profile of staff on the website of their department or faculty but having the profile with the repository is something that can be more productive,* PJ1.

Inclusive Cultural Orientation

Bridging the cultural diversity for the repository to form part of the community was the future predicament of IRs practice rather than technology (Lagzian, Abrizah, & Wee, 2015), Therefore, maintenance culture, good stewardship of the repository, awareness of cultural diversities, deposit of cultural heritage, and embedment of discipline culture in the practice were recommended by the participants as predictors for the implementation of sustainable IRs from cultural perspectives in the Nigerian context. This corroborates the proceeding literature that, positive attitude, effective leadership, good governance, and awareness are essential for the sustainability of digital preservation (Masenya & Ngulube, 202).

> *"Because the thing has to do with the orientation of the person in an administrative position if it happened to have a leader who is IT compliance you will find it easy to maintain. But if the person is not, you will find it not easy. That is why if you check DOAR you will see that the development is very slow, some universities have gone far, some are just starting, some are yet to start"*, PA1.
>
> *"For continuity, the chief executives of the library need to provide adequate leadership and develop the interest in the staff who are managing the repository"*, PJ1".
>
> *"By creating awareness on the cultural diversity through seminar sensitization will help in curtailing the noncontributory attitude of the researcher. Many people do not understand what IR all is about. I think is the work of the librarians to let them know when they know they will appreciate it. We need to carry them along People should be made aware of why they should submit their work. At least that you are submitting to increase your visibility and that of the institution and to encourage research collaboration. I think if we do that practice will be sustained*, PN3".

Collaborative Industrial Partnership

Finally, establishing a partnership with journals, publishers, other scholarly platforms, repositories, and digital libraries for data harvesting and content deposit into the repository, as well as collaborative digital preservation and support for the open access movement for the effectiveness of the repository practice were highlighted from the result of the interview analysis as requirements for the implementation of sustainable IRs from the industrial perspective. This implies that it is not feasible for a single university to manage a sustainable scholarly publishing system such as IRs without establishing partnerships with other organizations from industrial perspectives. The finding vindicates the proposal of Eschenfelder et al. (2019). The finding was also among the recommendations of literature for smooth and sustainable development of digital libraries, repositories (Chowdhury, 2014).

"Alliance with publishers for direct deposit of published papers on the repository or issuing a repository copy is also a good initiative that can enhance the sustainability of content recruitment", PA3.
"I am sure that partnership with publisher or open access journals for direct deposit of publications into author's repository will help in sustaining the practice, it will also motivate other staff and scholars to be able to submit their work willingly or unwillingly. I believe such an initiative will be most welcome. All that is needed is visibility and access to research work, what is the essence of making discovering without people getting to know about it as wide as possible, I think it largely to the advantage of the researcher", PJ1.

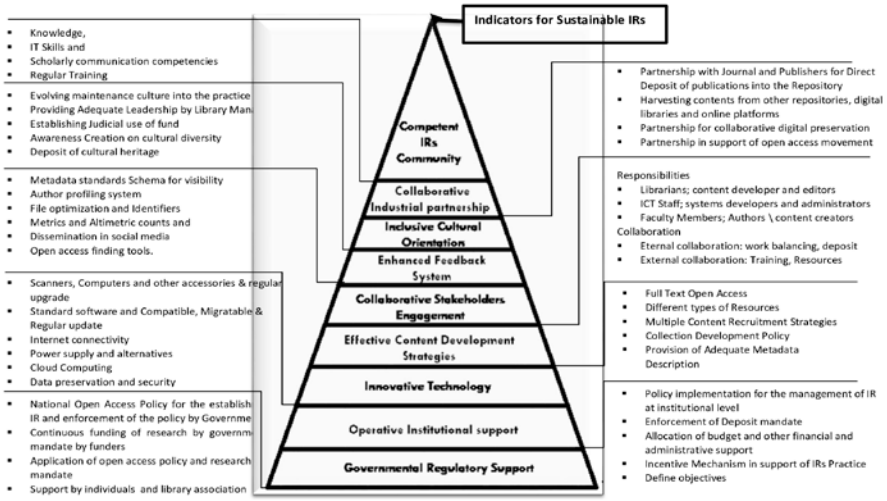

Figure 1: Indicators for Sustainable IRs

Conclusion

The data that emerged from the thematic analysis revealed 44 indicators for the implementation of sustainable IRs. For easy implementation, the explored indicators were grouped into nine categories. The indicator includes among others; national open-access policies for the implementation of IRs across research institutions, administrative institutional support, teamwork and collaboration between stakeholders, content development policies, regular training on scholarly communication and repository management, standard repository platforms, metrics, and altimetric counts, adequate leadership traits and partnership with journals\ publishers. The indicators are interrelated and work together in harmony to inform the status of sustainable IRs practice. Therefore, appropriate application of these indicators will go a long way in shaping the future sustainability as well as gauging the level of implementation of sustainable IRs. As in many fields, sustainability issue is not yet solved in a satisfactory manner. This paper provides a basis for understanding the peril of IRs sustainability. The paper will serve as a good guide for the implementation of sustainable IRs within academic institutions

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