

Challenges and Prospects of Digital Institutional Repositories in Developing Economies

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ABSTRACT

The paper discusses the origin and meanings of repository. It gives a background to the evolution of institutional repositories; and why they are necessary and useful. The paper presents an insight into the objectives, as well as how they are created; not leaving out their hosting for enhanced visibility of research outputs. The prospects of institutional repositories are well discussed. It highlights perceptions, values, attached to use and sustenance. Some enabling factors are discussed as well as the challenges associated with repositories, the Nigerian environment is given attention.

KEYWORDS: Digital Institutional Repositories; Developing Economies; Prospects, Challenges.

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I. Introduction:

The word “repository” is from the Latin word “Repositorium”. It has attracted various meanings depending on the context and period of usage. The ordinary definition ranges from its being described as a receptacle, a place where things are kept, deposited, stored or offered for sale. It was also seen as an abundant source of supply storehouse; a repository of information. It was also used as a burial place; sepulchre. A repository could also mean a person to whom something is entrusted or confided. It could also ultimately mean a warehouse. All these, point to the library itself which has often been linked to the word “repository” as it is often called a repository of knowledge. The concern in this paper is the Institutional Repository (IR).

What is Institutional Repository?

An Institutional repository is an on-line archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. IR remains one of the products of the information age which ICT has bestowed on the knowledge community.

For a University, in order to attract global visibility, materials such as academic journal articles both before (pre-print) and after (post print) undergoing peer review, as well as digital versions of theses and dissertations. It equally includes other academic or intellectual outputs of its academics, course notes, learning objects, and manuals. Some important administrative documents may equally be in the repository such as the Senate and Governing Council documents and Management memos.

Deposit of materials by members of the University may be made mandatory.

The content of an IR is more of a policy issue and this context may vary slightly from one institution to the other. An IR could be subject-based or institutional in focus.

IR may contain a wide range of materials that reflect the intellectual wealth of an institution, like journal articles submitted for publication, articles (pre-prints) accepted for publication (post prints) conference and seminar papers, university and faculty lectures, e-learning materials, monographs, working papers, doctoral theses and dissertations, data sets resulting from research projects among others. However, some may have more complex composition such as (websites advanced learning objects, 3D topographical representations and other data sets which may equally present some technological challenges.

Some IR may contain a mix of materials and such as referred to as “hybrid” repositories. The most widely implemented type of IR is the “e print” i.e. electronics pre-prints and post prints publications or research papers (Pennock & Lewis, 2007)

Why Institutional Repository?

The discourse on IR rests on ready availability and ease/open access to information which ultimately defy geographical location. Institutional repositories are partly linked to the notion of digital inter-operability, which is linked to the Open Archives Initiative (OAI) and its Open Archives Initiative Protocol for Metadata Harvesting (OAI – PMH). The OAI has its root in the notion of a “Universal Preprint Service” now superseded by the Open Access Movement. The history of IR cannot be separated from the concept of digital library – i.e. collecting, housing, classifying, cataloguing, curating, preserving, and providing access to digital content, analogues with the library’s conventional function of collecting, housing, classifying, curating, preserving and providing access to analogue content. The confederation of Open Access Repositories (COAR) in its manifesto states that:

“Each individual repository is of limited value for research: the real power of OPEN ACCESS lies in the possibility of connecting and tying together repositories, which is why we need interoperability. In order to create a seamless layer of content through connected repositories from around the world, open access relies on interoperability, the ability for systems to communicate with each other and pass information back and forth in a usable format. Interoperability allows us to exploit today’s computational power so that we can aggregate, data mine, create new tools and services, and generate new knowledge from repository content”

Institutional repositories are one of the recommended ways to achieve access, sometimes referred to as the “self-archiving” or “green route”.

Background To IRs Evolvement

Parker (2008) notes that the idea that led to the development of IR grew out of the Open Access Movement with the main goal of enhancing free scholarly communication. The earliest precursors of IR were discipline-based repositories, such as “Working Paper in Economics” now known as “Econ Papers” and ArXiv for Physics, Mathematics and Computer Science. The advent of the World Wide Web (www) started with IR. In 1991, the e-print service ArXiv was developed by Los Alamos Physicist, Paul Ginsparg. This eventually led to the Open Archive Initiative which enabled institutional repositories to operate together. In 2001, e-print was developed, which DSPAC, HP and FEDORA were all developed in 2002.

These softwares are now used as platforms to deplore IRs. These programmes provide structured data-entry points for digital resources leading to semantic relationships. Semantic relationships are further enhanced by the introduction meta data – information about data; which makes ability to find relevant materials rather than access possible. The fundability of resources is used to denote the aggregation of relevant materials in their order of importance, with synonyms, and with options for different media or format, such as texts, sound, motion, graphics, or any combinations of these. (Akintunde&Anjo) (Year?)

Why IR?

- Cost of journals
- Insufficient budget
- Unstable exchange rate
- ICT development.

These factors among which is the rise in costs of journals which has provided great incentives for Universities and libraries to work towards developing alternative way of which the development of institutional repositories is prime. This began to emerge in the early years of this decade, and some notable examples include e-print at Australian National University 2001, and D-space at the MIT, the University of Edinburgh Research Archive, and e-Scholarship at the University of California, all came on board in 2002.

Additionally, a new dimension in the interest in IRs is the growing light of current developments such as the NIH mandate to make the products of tax payers funded research freely available to the public and universities like Harvard urging their faculty members to deposit papers and other publications in the Institutional Repositories.

What Are The Objectives Of Institutional Repositories?

Institutional repositories are closely tied to the ideals and goals of creating a level ground in access to scholarly communication. IRs symbolize the power in pulling resources together which economies regard as “economy of large scale production”.

IRs evolved to fulfil some major objectives. These include:

- to provide open access to institutional research output by self-archiving it;
- to create global visibility for an institution’s scholarly research;
- to collect and pull contents together in a single location;
- to store and preserve other institutional digital assets, including unpublished or otherwise easily lost literature; or those that are rare – grey literature;

- to promote information sharing;
- to ensure that the benefits of scholarly work reach every society;
- to bridge the gap between the information countries and the information – poor countries;
- to replace the old time invisible college of experts with global on-line “Colleges”;
- to ensure that no research output is lost.

Ultimately the purposed of IR remains the desire to bring together and preserve for easy access the intellectual work of an institution. They are necessary marketing tools communicating capabilities and quality by show casing faculty and student research, public service projects and other town and sown activities. The continued increase in demand for scholarly work has continued to make IR necessary. In the information age, information has assumed economic value a powerful tool to policy and decision making and a conveyor of development; IRs have therefore emerged as the needed engine to propel information availability, access, dissemination and usage.

How Is IR Created?

The creation of IR must first be viewed from the policy end. There must be the desire by policy makers to establish it. Its desirability, scope and substance all come under policy matters in every establishment that desires to create it. The technical capability of an institution to create and manage its content is equally important. This involves a lot of Technical issues on selection, collection, organization and dissemination of digital content.

It is necessary to determine its content, structure, quality control, storage format and promotion. Is it going to be post prints or multimedia?

The audience determination has to do with the content. The scope of input by target members of the community. Is it mandatory or obligatory? It has to be determined whether input is limited by status IRs have three technical layers. These are:

- (1) input layer – shows various kinds of terminals with documents such as journal articles, theses, dissertations, research and conference papers, e-learning materials, lecture notes, bulletins etc.
- (2) Process layer – this involves cataloguing using online facilities that are available – D Space – greenstone etc.
- (3) Output layer – The output layer has to do with access. It could be internet compatible and it could be based on the intranet of the hosting institution. It could also be a combination of two, determining which materials are internet-based and intranet-based.

Hosting For Accessibility

There is the need for IRs to be hosted for needed access. There are a host of sites which could be used. These include:

- Directory of Open Access Repository (DOAR) <http://www.opendoar.org>
- Registry of Open Access Repository (ROAR) <http://www.archieves.eprints.org>
- Dspace Open Source <http://www.dspace.org>
- FEDORA Open Source <http://www.fedora-commons.org>
- Greenstone Digital Library <http://www.greenstone.org>
- SHERPA/ROMEO <http://www.sherpa.ac.uk/romeo>

Others include – URL, E prints, ARNO, ETS-db etc.

Prospects of IRs

The potentials of repositories are being recognized by funding bodies worldwide and there is an international trend of funding bodies requiring publication of research results through repositories. Corleley (2011).

Mohammed (2013) presents some prospects as:

The use of the Open Access model as a way to reduce costs and increase access is a point made. IRs has greater potentials than other types of information resources for disseminating research. IRs can gather and provide access to a wide range of grey resources, i.e., material not in a journal article format, such as theses, datasets, presentations, archive documents and images.

IRs allows information to be shared with external as well as internal users of the organization thereby gaining recognition for the institution’s research outputs.

Institutional repositories (IRs) are increasingly deployed in academic institutions to manage a variety of digital content including educational, research, and archival materials.

Increased knowledge sharing, control over the digital assets of the university and preservation. Stewardship, efficiencies, showcasing an institution and wider distribution as compelling reasons for establishing an IR.

According to Heery (2009) IRs bring about the advantage of open science.

Open Science is the norm, with data produced in labs typically being stored automatically and made open for re-use.

The primary level of social interaction for researchers, teachers and learners is at the group level (cross institutional project, institutional research, lab or teaching group).

- The desire for better communication among researchers, the need to pull together in one source, resources from many sources, have made IRs very necessary;
- The need to conquer the mountain of papers and equally tame the jungle of electronic information have equally made the idea of IRs very inviting;
- To ensure ultimate utilization of information assets;
- The need to make the best uses of emerging technologies;
- Ensuring security and integrity;
- Complying with the laws;
- Liberating and saving the time of staff and users

The facts enumerated above are key issues in considering the prospects of IRs as positive development to research. Aside the points earlier raised, other prospects include:

Opening up output of an institution to the global audience.

- Maximization of global visibility.
- Bringing information to the door step of researchers.
- Self archiving of digital content.
- Supporting students endeavour to research materials.
- Providing workspace for collation.
- Providing unified access institutions scholarship.
- Boosting prestige of institution.
- Better service to contributors.
- Solution to presentation problem.

Challenges of IRs

Scholars are of the opinion that getting the attention for an IR is challenging, and understanding what the stakeholders and target audience want and equally need may be an uphill task. Reiger(2007) is of the opinion that conducting a needs assessment before a repository is established may be desirable to avoid potential pitfalls. The need to raise awareness, recognition, and branding of IRs should be consider as priority.Literature has highlighted low level of awareness in some universities. Studies by Swan and Brown,2004; Roland and Nicholas,2005;Watson,2007;Morris and Thorns,2009; and Moore,2011, report low level of awareness buy users with associated negative effects. Iriberry and Leroy(2009) indicated in their research that if a network-based service's intended communities do not get engaged or participate in its emergence, the service will die naturally.

Closely related is the issue of recruiting contents, usually as a result of lack of adequate understanding of the service by potential beneficiaries. The perceptions of these potential audience, may rate the need to participate by depositing their works as unnecessary. Another challenge is the value proposition attached to the service, which may be low. WachaandWisner(2011) in a study of forty five IRs found out that only three of the number studied contained highest impact articles of the faculty at the institutions.

Conway (1996) says of IR's

“Our capacity to record information has increased exponentially over time; the longevity of the media used to store the information has decreased equivalently. Illuminated manuscripts have lasted for over a thousand years but CDS will degrade in 15 years.”

The greatest challenge to IRs is the “runaway technologies” which it ultimately has to employ.

In spite of the advantages or seeming positive influence of ICT, it has a potentially disruptive influence that tend interfere with organisational culture. This often manifests in the lengthy and complicated policy issues associated with it; and the need for continuous update and upgrade of software.

- Problem of providing adequate staffing support.
- Uninterrupted source of energy could pose a challenge in developing countries.
- Regular internet access may be an issue.
- Legal consideration.
- Negotiation of content and priorities of users.
- Management and preservation of content.
- Decision on access and use.
- Copyright issues – ownership, as well as patents for research work that becomes a product.

- Preservation of indigenous knowledge.
- Issues on collaboration.
- University libraries have often been at the receiving ends on failure to establish functional IRs in developing economies and Nigeria in particular. This however appears to be economical with the truth because there is the need for collaboration across board in individual universities.

The creation, sustenance of IRs involve some collective responsibilities. Creating a successful IR therefore requires what experts and scholars say involves eight “Cs”

Comprehension

Collaboration

Context

Change

Caring

Commitment

Creativity

Competence.

IRs And The Nigerian Environment.

Nigeria has the highest number of Universities in sub-Saharan Africa. Research remains one of the major functions of Universities. The need to make the research productivity of the Nigerian Universities visible has been a work in progress. The mortality rate of journals in the University system in Nigeria has been a cause for some worry; coupled with the poor distributions of the available ones. The implication of this is that most researches conducted are contained in themselves. Aina (1983) submits that access to scientific and technological information in Nigeria is rather poor. His findings reveal that out of 7,014 scientific papers published between 1900 and 1975, journal articles amounted to 5,607 (79%), and 1,116 or (20%) of these articles were not indexed or abstracted, making them inaccessible. Analysis shows further that 77% of papers not covered by any indexing and abstracting services were published in Nigeria. Furthermore, Lucas (2003) opines that valuable information which are generated from health research are not widely applied to the benefit of Nigerians because many practitioners are not fully aware of the current scientific information.

Efforts have been made at different fora to arrest this situation. The National Universities Commission in 2004 organized the first “Nigerian Universities Research/Technology Fair” where research and technological innovations were showcased. This has continued to date. However, attendance at these fairs has not fully yielded the needed result.

An International Workshop was held in Ahmadu Bello University, Zaria, in 2008 on Open Access repositories. It was a wake-up call on Nigerian Universities to make concerted effort at organizing and harnessing their research output for better communication and collaboration, by developing Open Educational Resources (OER)

The Association of African Universities also held workshop in collaboration with the Committee of Vice Chancellors of Nigerian Universities on the need for all Nigerian Universities to make their output available by establishing Institutional Repositories which will be accessible to other Universities in Africa.

All Ph.D theses, Masters dissertations, first degree long-essays, institutional journals and outputs from Universities are to be digitized and made available on-line. A major challenge is the lack of Information Communications Technologies road map in most Nigerian universities. The absence of planned policies on ICT infrastructures and info-structure make consistent and sustained ICT infrastructure development difficult, leaving a sour taste in the mouth. There are issues in the area of bandwidth adequacy, maintenance and sustenance of hardware, as well as streamlining copyright and patent issues relating to staff, students and the university. Records from the Federal Ministry of Education revealed that from 2010 to 2019, a period of ten years, the university system in Nigeria only created twenty five institutional repositories.

In spite of these notable efforts, only very few institutions in Nigeria have established IRs.

It is to be noted that South Africa has 19 active IRs, Egypt has 6 as well as Kenya..

Some issues identified by existing literature as being responsible for the slow emergence of IRs in Africa include:

- lack of knowledge or awareness of open access institutional repositories;
- poor state of information and communication technology;
- inadequate advocacy for open repository;
- poor funding;
- copyright and intellectual property right.

The most common problem affecting the use of scholarly communication in Universities have been outlined and discussed in various studies. The following are frequently reported as scholarly communication problems facing Nigerian Universities:

- Low funding of research and higher education;
- Low staff morale due to low salaries and unsatisfactory research reward system.
- Brain drain; and academic tourism, wherein academics take up adjunct lecturing positions in two or more universities.
- Overburdening of researchers with teaching and administrative duties.
- Low exploitation of ICTs;
- Serial crises, work to rule and strike actions (Ivwithreghweta, 2012).

A host of other factors have hindered the expected level of availability of IRs in Nigeria. These include social economic factors, technological factor, political issue within individual institutions; mind of experts. Inadequate information and technological literacy on the part of government and policy makers in various institutions among others.

There are arguments with regards to which unit within an institution to be saddled with the responsibility of creating and managing IRs. Ivwithreghweta, (2012) cites studies by De Beer (2005), Kaur and Ping (2009), Pelizzar (2003) and Christian (2011) indicating that over 70% of respondents singled out the library as the structure to be given the mandate of managing Institutional Archives.

Genoni (2004) states that the most significant challenge facing academic libraries in undertaking responsibility for IRs creation and management is not technical. He says the major challenge is cultural. There is no common view among the library, faculty IT staff, instructional designers, Administrators and Policy Makers as to what IRs should be and who and how it should be handled. This has brought about the negative influence of individual or group prejudices

The problem of the digital divide must not be overlooked when venturing into the issue of IRs. In spite of the accruing advantages of venturing into the information society which ICT has presented; there has continued to be agreeable concerns of the challenges posed by the use and application of ICTs. This in itself has brought about the “digital divide”.

What Are The Enabling Factors?

What are those factors that will make it possible for Nigeria and other African countries to have an equitable access, use and application of ICTs and stop being pseudo allies?

Zainab, Abdullah & Edzon (2002) identify the existence of five supportive factors:-

- A well developed info-structure
- Information communications technology literacy, a community that is IT literate.
- Information literacy, a community with necessary info skills.
- Supportive governance.
- Information and communication technologies, reliable and robust ICT infrastructure.

Other factors may include a conducive political environment within the country and also in each institution.

- Needed financial muscle.

It is to be noted that some factors will hinder use of ICT gainfully.

- Mind of experts.
- Information isolates.
- Lack of info skills.
- Lack of economic power.
- Lack of commitment to manpower development.

In conclusion for Institutional Repositories to take proper root and equally gain ground in Nigerian Universities, the social environment must be conducive. Members of the University Communities must be mentally ready to accept the new order of information sharing. They must move from isolates to interconnectivity. They must increase collaboration, openness, transparency between and among those holding information. Local content must be made valuable. Availability of applicable infostructure could provide a community with necessary context, experience, and content to utilize information into knowledge.

The conducive experiences, context and content could contribute to a positive attitude in harnessing information for development which is the essence of research in Universities; as agents and tools of development.

A governance that functions on ICT based models could emerge from these efforts, spear heading efforts at digitalizing information to be made available.

A skilled intellectual force with strong penetration up to village and household levels could emerge.

It is ‘ultimately this human capital and ICT that can propel new approaches to solving problems, create new business culture, new products, services and new knowledge.

Communities will only benefit directly from the University community if and when information is revolutionized – with’

Sound technologies and infrastructures to access information which must be provided in public domain.

There must be commitment to training skilled workers to develop, maintain and provide value-added products and services. This will increase the technical and managerial capabilities of decision makers or economic agents; by instituting conducive policies that will promote equitable participation in the knowledge society as both products and consumers of information and knowledge.

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