Library Philosophy and Practice (e-journal)   Libraries at University of Nebraska-Lincoln

2018

Scholarly Communication via Institutional Repositories: A Ghanaian Perspective

Ebenezer Martin-Yeboah Mr.
University of Cape Coast, Ghana, ebenezer.martin-yeboah@ucc.edu.gh

Anankyela Anaba Alemna Prof.
University of Ghana, aaalemna@ug.edu.gh

Emannuel Adjei Dr
University of Ghana, eadjei881@gmil.com

Background to the study

Universities, research institutions, museums and governmental organizations retain artifacts such as scientific, technological, cultural, artistic and historical materials which embody their very culture and identity. In order to ensure their perpetuity, such intellectual outputs and historical documents are not only being digitized, but are now being managed, preserved, and maintained in repositories. In many academic environments, institutional repositories (IRs) appear to be the latest approach in the quest to manage intellectual outputs. They are, as Lynch (2003) puts it, a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members.

As a system that facilitates the capture, storage, preservation and dissemination of the intellectual output of an organization in electronic form, institutional repository (IR) outputs differ from institution to institution. Whereas some capture theses and dissertations, others capture published papers, pre-prints and post-prints of journal articles, working papers, conference presentations, research data sets, teaching materials, historical or administrative records and other similar materials (de Sompel & Lagoze, 2000; de Sompel & Lagoze, 2001; Crow, 2002; Campbell-Meier, 2008; Rosenblum, 2008).

The advent of the internet has transformed how libraries store information. Having traditionally remained as storehouses of print publications, libraries are now expanding services by collecting digital contents and becoming content providers by digitizing archival and special collections (Campbell-Meier, 2008). In many academic institutions, the library has been instrumental in the development of repositories, often being solely responsible for their development and operations (Moahi, 2009).

Although institutional repositories are a relatively new phenomenon, OpenDOAR, the Directory of Open Access Repositories (2018), reports of over 1000 institutional repositories in the world with 158 in Africa, and 33 of such from South African universities. According to Corletey (2011), the first institutional repository in Ghana was implemented at the Kwame Nkrumah University of Science and Technology (KNUST) in 2008. Six months later, and with 560 postgraduate theses recorded in the repository, KNUST, in its maiden appearance, was ranked by webometrics as 52nd of the 100 best universities in Africa. This success resulted in the implementation of repositories in four academic institutions through the help of Consortium of Academic and Research Libraries in Ghana (CARLIGH) and International Network for the Availability of Scientific Publication (INASP) (Corletey, 2011). Currently most universities in Ghana, both publicly funded and privately-owned, are gradually embracing the concept of institutional repositories.

Statement of the problem

In spite of the many benefits and successes of institutional repositories recorded in the literature, such as being a vehicle for wider dissemination, author and institutional image enhancement and platform for preservation, existing studies suggest that repositories are not yet sustainable in most African academic institutions. The literature on institutional repositories in Ghana and Africa suggest that many of the institutional repositories become out of function shortly after take-off. These failures have often been attributed to financial constraints and technical issues such as software and engineering protocols for developing these IRs (Bailey, 2006; Rieger, 2007; Campbell-Meier, 2008; Moahi, 2009; Corletey, 2011).

However, in examining the sustainability of institutional repositories, it is prudent to empirically assess the issues pertaining to the campus-wide collaborative efforts at their creation and management. There is the need to understand the peculiar cultural and political issues affecting

repository demand, lest an expensive mistake is made to implement an institutional repository that simply has no depositors or users.

Objectives of the study

The purpose of the study is to comparatively assess how operational institutional repositories are created and sustainably managed for use and acceptance by the academic community and beyond. Specifically, the study seeks to:

- Examine the policies for the creation and management of institutional repositories;

- Measure the level of collaboration in the creation and management of IRs;

- Describe the contents of institutional repositories;

- Identify the preservation strategies for managing Institutional repositories; and

- Establish the challenges faced in the management of institutional repositories.
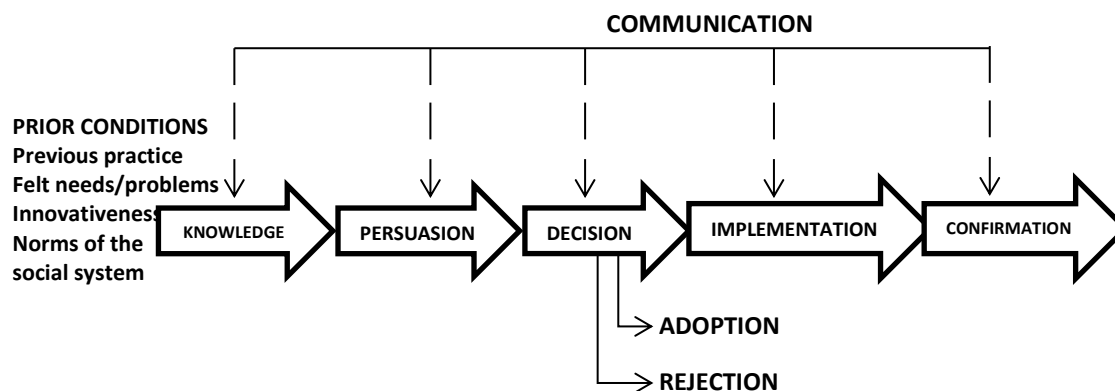
Scope and limitation of the study

This study sought to investigate the institutional repositories of two public universities, the University of Ghana and Kwame Nkrumah University of Science and Technology; and two privately-owned universities in Ghana, Ashesi University College and Central University.

Theoretical framework

The study adopted the Diffusion of Innovations Theory as its theoretical framework. Diffusion of Innovations is a theory which attempts to describe how, why, and at what rate new ideas and technology transmit from one society to another. Rogers (2003) considers diffusion to be the process by which an innovation is communicated among members of a society across certain channels over time. An innovation could be an idea, practice or object that is perceived as new by an individual or unit for adoption. Rogers (2003) believes that for an innovation to spread and be adopted, it should have: relatively better advantages over the existing technology, an appreciable

ease of use, and be compatible with the existing values, past experiences and the needs of potential users within the social system. The innovation-decision process thus involves five steps: knowledge, persuasion, decision, implementation, and confirmation. Knowledge takes place when a prospective adopter becomes aware of the existence of an innovation and thinks of how it functions. A person is assisted to form a positive attitude or a negative attitude towards an innovation through persuasion. The process of decision has to do with making a choice to either adopt or reject the innovation. Implementation occurs when an innovation has been put to use. These steps follow each other in a time-ordered manner as shown in Figure 1 below:
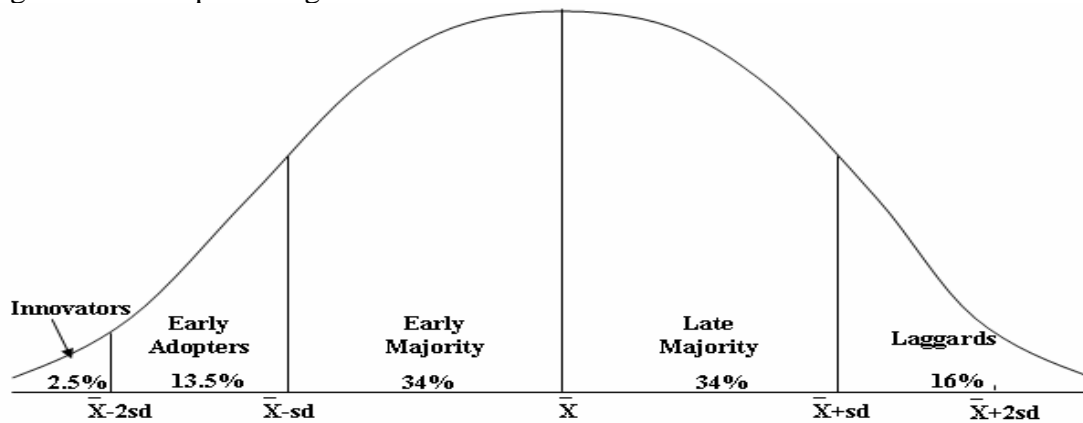
Figure 1.1: A Model of the Five Stages in the Innovation-Decision Process

Source: Rogers (2003, p165)

For Rogers (2003), whereas adoption is a decision of full use of an innovation as the best course of action available, rejection is a decision not to adopt an innovation. The theory identifies adopter categories as being the classification of members of a social system on the basis of innovativeness, as shown in Figure 2, including innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003).

Figure 1.2: Adopter categories in the Innovation-Decision Process

Source: Rogers (2003: p.165)

Innovators play a gate keeping role in the flow of new ideas into a system. Early adopters are individuals more integrated into the social system who adopt an innovation and become a reference point for prospective adopters. The early majority adopt new ideas just before the average member of a system. The late majority adopt new ideas probably as a result of increasing network pressures from peers. Laggards are the last to adopt an innovation because they are suspicious of innovations and change agents.

Swanepoel (2005) and Campbell-Meier (2009) applied the Diffusion of Innovation Theory to a study of the development of institutional repositories in some institutions where it was believed that the concept was in the early majority adoption category.

Significance of the study

The fact that academic institutions are gradually embracing institutional repositories is a justification for such a study to explore factors relating to their creation, management and sustainability. This study assembles all the relevant issues regarding institutional repositories into a unified coherent document that could be referred to by policy makers of any institution hoping to establish a repository. By identifying crucial factors in institutional repository development, and

the challenges that the factors pose, a developmental framework can be identified for interested libraries.

Also, it may be useful to information professionals in their bid to build strong associations in the academic community, understand the diverse needs and interests of the campus community and by so doing, be in the position to acquire contents to populate their repositories and promote their use.

Again, this study contributes to the body of knowledge in the area of open access institutional repositories, especially in Africa and by extension, project the academic productivity of both private and public universities.

LITERATURE REVIEW

Intellectual productivity and scholarly communication

Access to knowledge is fundamental to all aspects of human development, yet avenues of sharing academic outputs as well as access to academic publications is restricted in many developing countries. For example, even though lots of research activities occur in Africa, the continent is said to account for 2% of the research output of the world (Moahi, 2012). Most of such research outcomes emanating from African universities are often obscured due to inadequate indigenous journals as well as issues of copyright (Alemna, 1998; Alemna, 2005). The alternative, as revealed by Moahi (2009), is that African academics strive to publish in internationally renowned peer-reviewed journals in order to ensure academic promotion, but then, again, not many of these do make it into such journals. And the few, when they do, are, by reason of cost, out of reach of most university libraries in Africa thereby rendering access difficult.

This situation has largely resulted in the inability to integrate the continent's research into the global knowledge pool (Wellcome Trust, 2003; Abukutsa-Onyango, 2010; Harnad, 2010). Changing the current structure of scholarly publishing requires collaboration with key stakeholders such as faculty, librarians and publishers (Johnson, 2000; Ming, 2002). Well-established journals wield the power to control the process of professional advancement but are in turn dependent on faculty content to also survive (Tiamiyu & Aina, 2008). Issues of professional recognition, contributions to scholarship and career progression have often been of high interest to academic authors. Thus authors are willing to give away the copyright of articles they have written in exchange for the services of the publisher in the form of peer-review, quality labeling, marketing and disseminating (Bjork, 2004). In return, the author gains recognition in the academic field and career advancement.

It is upon the realization of this unbridled advantage of publishers, by dissatisfied authors who are the providers of the raw materials, and librarians who depend on these journals to build their collections, that the digital option of open scholarly communication or online publishing without restrictions has been embraced and explored (Correia & Teixeira 2005). It is therefore not surprising that the concept of 'open access' to electronic resources is so rife in the information literature.

Open Access

As a concept, Open access (OA) means an unlimited access to online peer-reviewed scholarly research works such as thesis, dissertations, book chapters, and scholarly monographs (Schwartz, 2012; Schopfel & Prost, 2013). Open-access resources are digital, online, free of charge, and free of most the copyright and licensing restrictions, and may go beyond scholarly publications to include non-scholarly materials such as music, movies, and novels (Suber 2012).

'Open Access', as a term, was formally introduced during conferences in Budapest, Bethesda and Berlin, in the early 2000s (Suber, 2003). All three conferences called for the removal of price and all forms of barriers to scholarly information. For instance, the Budapest Open Access Initiative (2002) statement, where the term 'open access' was formally coined, reads as follows:

> *By "open access" to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.*

Before these conferences, however, Harnad (2004) argued that an attempt to make access to online journal articles freely available had been in place; with the first online-only, free-access journals appearing in the late 1980s. Jain (2012) is of the view that, open access institutional repositories seem to be receiving significant acceptance.

Several authorities have defined online digital open access repositories differently. Johnson (2002) views a digital institutional repository as any collection of digital materials hosted, owned, controlled, or disseminated by a college or university, irrespective of purpose or provenance. Swan and Chan (2009) consider open access institutional repositories as digital collections of the members of a university's research community that make their contents freely available over the internet for archiving and long-term preservation.

Academic libraries and institutional repositories

Academic libraries play a significant role in ensuring that academic institutions meet their research mandate. It is only through a library well-equipped and endowed with print and electronic information resources that scholars can keep pace with developments in various disciplines and transmit same to students (Kavulya, 2004). Unfortunately, annual budget cuts, inflation and the increasing cost of journals and books present challenges to libraries in meeting this mandate.

The benefits associated with open access have led academic libraries to participate actively in the open access movement (Swan & Chan, 2009). This new approach to scholarly communication, even though has some challenges, presents promising opportunities such as reduced cost through eliminating the publisher as a middleman (Giarlo, 2005). It is the view of Grundmann (2009) that institutional repositories have received a wider embrace due to the fastest route to unrestricted access to a wider range of scholarly and research literature.

The significant role that a university library plays in institutional repositories has been acknowledged by many scholars. In a study by Kavulya (2004) of academic libraries in Kenya, it was revealed that apart from collection, processing and storage of traditional materials, academic libraries have become centres for the distribution of repository contents, with the librarian playing the roles of a teacher and a guide to the campus community by ways of investigation and research. In Malaysia, academic libraries are the pioneers of open access institutional repository initiatives created for a wider dissemination of scholarly literature by their own community members (Kiran & Yip, 2009). As the Directory of Open Access Journal (DOAJ, 2011) succinctly puts it, libraries today are becoming alternative publishers through open access institutional repositories. Open access institutional repositories provide improved visibility and institutional presence to librarians by according them the opportunity to work hand-in-hand with academia. In many academic

institutions, librarians do lead the way and provide the skills required to develop and run an effective IR in areas such as copyright checking, metadata creation, authority control and to a larger extent, championing the entire project (Walters, 2007, Daly & Organ, 2009, Bankier, Foster, & Wiley, 2009, Jain, 2011).

Barriers to institutional repositories in Developing Countries

In spite of the various benefits, there are several challenges and barriers to the smooth take-off and sustainability of institutional repositories in Africa. The high cost of Information and Communication Technologies, connectivity and poor telecommunication in developing countries makes the sustainability of open access repositories very difficult (Giarlo, 2005, Canada, 2009). According to Dicovitsky (2010), developing countries are still struggling to achieve broadband services even though significant improvements have been made in access to mobile technology and infrastructure. Pickton and Barwick (2006) observe that the problem of repository unsustainability often does not lie in the initial set-up cost but rather, regular maintenance cost. The required funding needed to upgrade and maintain IRs is lacking in many developing countries (Christian, 2006, Christian, 2008, Canada, 2009).

The issue of little or no institutional support to IRs is a great drawback. In his observation, Christian (2008) points out that knowledge about the benefits of open access institutional repositories is very low among the major stakeholders like lecturers, researchers, librarians and students. Thus, commitment and support seldom come from key stakeholders (Pickton and Barwick, 2006). In most cases, researchers accustomed to the well-established routines of publication in academic journals of known prestige, with effective systems of peer review and dissemination, see little benefit in alternative methods of access to the same material (Cullen & Chawner, cited in Jain, 2012). In India both top-down and bottom-up approaches are used to create

awareness of open access through talks at local and international fora, local workshops and via reputable databases such as Bioline (Fernandez, 2006).

The issue of copyright cannot also be overlooked in any discussion of challenges confronting institutional repositories whether globally or in Africa. When it comes to alternative publishing arrangements, it often becomes difficult for researchers to negotiate their intellectual property rights to their advantage. In most cases, because some researchers do not have adequate knowledge about intellectual property rights issues, they end up being too careful not to infringe upon publisher copyright. In the same vein, publishers have developed a subtle opposition to institutional repositories since they see it as a competition and threat to their business (Pickton & Barwick, 2006; Davis & Connolly, 2007; Moahi, 2012). In a typical situation in Nigeria, Christian (2008) reveals that the International Institute of Tropical Agriculture (IITA) developed an institutional repository, but the repository could not go public due to some copyright issues. This was because copyright in research works conducted by the researchers at the Institute had been signed away to commercial journal publishers (Christian, 2008).

Closely knit to the intellectual property right issues is the difficulty in generating content, especially in the early life of the IR. This problem stems from the unwillingness on the part of academics to deposit their research work, and has compelled one of the e-Print pioneers, Stephen Harnad to suggest a self-archiving feature. It is believed that when it becomes mandatory for the academic community to populate repositories, it will cause the repositories to function at optimal capacity (Bankier & Perciali, 2008; Xia, 2009). Gardner (2008) states that some universities and institutions like the Hong Kong and Harvard universities have already started with this option.

One major reason why academics prefer to publish in commercial journals is the promotion value that such publications have on their career progression. This is however missing in publishing in institutional repositories. This gives academics little motivation to cooperate with this form of open access initiative. To make open access institutional repositories a viable alternative to the traditional peer-reviewed journals it is important for academics to have a healthy debate on the issue and accord submission of scholarly articles to IRs equal recognition as peer-reviewed journals.

MATERIALS AND METHODS

Research design

The case study approach was used to carry out the study. Case studies seek to provide an in-depth description of the features or attributes of a particular phenomenon (Hamel, Dufour & Fortin, 1993; Sarantakos, 2005). In the view of Creswell (2009), a case study is an empirical inquiry, in which focus is on a contemporary phenomenon within its real-life context. Not only is a case study flexible, but it can introduce new and unexpected results during its course, and lead to research taking new directions.

This study used comparative case study approach to investigate the creation and management of institutional repositories in two privately-owned – Ashesi University College (AUC), Central University (CUC), and two public-funded universities including the Kwame Nkrumah University of Science and Technology (KNUST), and University of Ghana (UG). This helped to highlight the similarities and differences between cases, and identify areas that have direct implications for institutional repository development.

Selection of study participants

The study population comprised six key individuals responsible for the creation and management of the repository in each university such as the University Librarian, Digital Librarian, the University Archivist, Information and Communications Technology Director, the Dean of Graduate Studies and Research, and the University Public Relations Officer. However, to accommodate the unique culture in each campus, room was made for any other outfit or individuals whose responsibilities towards the repository demanded that their views be sought for inclusion in the study. Also, four lecturers from each university; two of whom had submitted research report/article to their respective repositories, and two who had not, were also engaged for their input, making a total of 10 participants from each university.

Beyond these human subjects, the policy documents establishing the repository as well as the websites hosting the repositories were engaged in the study. It must be noted, however, that in some study areas, some of the key informants listed above did not exist. For example, there was no Graduate School in Ashesi University College for which reason no Dean of Graduate School could be interviewed.

Again, it was only the University of Ghana which had a University Archivist and an Office of Research, Innovation and Development (ORID) having responsibilities towards the repository. The final sample for the study was thirty-seven in all with the AUC, CU, KNUST and UG having 8, 9, 9 and 11 respondents respectively.

The two lecturers with materials in their IRs were purposively selected from the websites hosting the various repositories. They were then contacted via e-mail and invited to participate in the study. They were subsequently interviewed face-to-face using a semi-structured interview guide.

To make it practically possible to identify willing lecturers who have never submitted materials into the repository to be interviewed, they were identified from the department of the lecturers who had deposited materials. They were approached, and their consent sought for their participation in the interview.

Instrumentation

Semi-structured interviews were used to elicit primary information from respondents. Within an institution, different sets of interview guides were used for the different categories of persons to be interviewed. However, across cases, same set of interview guides were used for the same sets of people. The interview guides included questions on IR policy, creation and preservation of the repository. Other key documents such as policy statements that supported the establishment of institutional repositories as well as the websites hosting the repositories were also examined.

Transcripts of the interviews were sent to participants to ensure that the content and contexts had been correctly recorded by the researcher. Not only did this allow for corrections and additions, but it also increased construct validity (Yin, 2003).

Data analysis

The researcher shares in the opinion of Bryne (2001) that a very large volume of detailed data emerge out of qualitative research, and since it is often subjective and contextually loaded. Data was thus analyzed according to its source (interview, repositories website and policy documents) and format (text or audio).

Interviews

The transcribed interviews were read through and coded according to the respective themes and subthemes drawn from the research questions of the study in order to bring out the emerging patterns and categories which provided the basis of analysis. In doing this, the entire transcribed

interviews were placed into a single MS Word document. After this, a Microsoft Access database was populated with the following fields:

- Unique ID (preceded by the initial of the university, for example UG 9, CU 1, KN 1, AS 2 for some respondents in University of Ghana, Central University, Kwame Nkrumah University of Science and Technology and Ashesi University College respectively);

- Role of the participant;

- Theme that the transcribed statement (data record) fits in;

- Coding based on research questions; and

- Page and line number from the MS Word document

Afterwards, categories and subcategories were identified within the themes to further sort the data. Once populated, the records were sorted by institution, theme, categories and sub-categories to form the foundation for the development of the comparative case study reports.

Repository policy document

There was content analysis of the policy documents that set up the various repositories. This was done by subjecting the policies to the objectives of the study. The purpose of this analysis was to situate the operation of the repository within the broad IR policy framework.

Repository website

The websites hosting the repositories were examined and analyzed with appropriate statistical tools such as tables, charts and graphs to describe the contents of the repository with respect to the number of theses, dissertations, journal articles, pre-prints and post-prints, lecture notes among others.

Upon analysis of the interviews, policy documents and website, a comprehensive cross case report regarding the analysis and discussion was developed. This report was a narrative of all the activities which go into the setting up of repositories in the study areas

Ethical considerations

The study shares in the view of Fraenkel and Wallen (2000) about the need to hold information acquired from respondents in confidence. Thus, participants were duly informed about the purpose of the study, and their consent was sought accordingly before being engaged in the study. They were also assured of their confidentiality and non-disclosure in the case of any classified information provided for the study. As a consequence the respondents were accorded the opportunity to confirm or revise the draft report of the transcribed interviews.

Lastly, all sources of literature used for this study were duly acknowledged in accordance with the tenets of academic honesty, copyright and fair use.

FINDINGS

Cross-case/comparative analysis of the four institutional repositories

Analysis of the transcript revealed that the main purposes for the establishment of IRs in the four universities are provision for unrestricted access to records/information, sharing of internal intellectual productivity, preservation of heritage, scholarly and administrative materials, and projection of the image of the academic community. This is clearly articulated by the following response. For instance, according to KN3, "Our repository is supposed to portray the intellectual output of the Kwame Nkrumah University of Science and Technology to the outside world". Corroborating this notion, AS 1 posits that "as a small university like Ashesi, the repository is what will make us visible to the rest of the world". A respondent from Central University, CU 1

also stated that "the repository enables us store and preserve most of our materials for long term access".

Planning and collaboration

In all the universities, the library and IT units directly dealt with the technical issues of repository development and also, collaborated with the public relations and other outfits such as Graduate School, to publicize the IR. This is clearly articulated by one of the respondents from Ashesi University (AS 1) as follows:

> *"Our motivation to develop and operate an institutional repository emanate from the various CARLIGH (Consortium of Academic and Research Libraries in Ghana) workshops on IR. A lot had to do with the image of the university, sharing of scholarly output and also, to some extent, the preservation of digital content" (AS 1). It is "mainly under the ambit of the library with the ICT outfit providing the connectivity backbone" (AS 2).*

A respondent from UG also said that "the development of the repository commenced with consultations with, and involvement of very significant stakeholders whose activities contribute to the bringing out of scholarly research" (UG 2). Again, the responses of UG 3, UG 6, UG 2 revealed that the outfit of the library engaged with the Office of Research, Innovation and Development (ORID), Public Relations Office, School of Graduate Studies and Research, UG Archives, the UG Computing Systems as well as some deans and heads of departments. In buttressing the efforts at wider stakeholder involvement, KN 6 concedes that "with the occasional seminars and workshops on digitization, and because many of these officials were aware of the IR concept as an existing standard practice in many foreign universities, the idea was embraced without much hesitation or opposition". A lecturer from KNUST puts it as follows:

"Yea, you know my PhD thesis was on institutional repositories because I read about it in a book called UNESCO's guide on Electronic Thesis and Dissertations (ETDs). My focus was on electronic thesis and dissertations, and I realized that ETDs are posted on IRs. So in fact, someone alerted me of something like that from the library in the pipeline. And in fact, I wanted to be on board because I was highly interested" (KN 6).

In the case of CU, "it was one lecturer who lobbied the Information and Communication Technology (ICT) outfit that we needed something like this. He sold the idea to us to formally initiate it" (CU 5). A summary of repository activities is shown in Table 1 below:

Table 1: IR of the various institutions under study

Institution	Name of IR	Main actors	Year launched
Ashesi University College	AIR	The library, ICT	2013
University of Ghana	UGSpace	The library, ICT, ORID, UG Archives	2011
Central University	CUCAR	ICT, the library	2014
Kwame Nkrumah University of Science and Technology	KNUSTSpace	The library, ICT	2008

Source: Field data, 2018

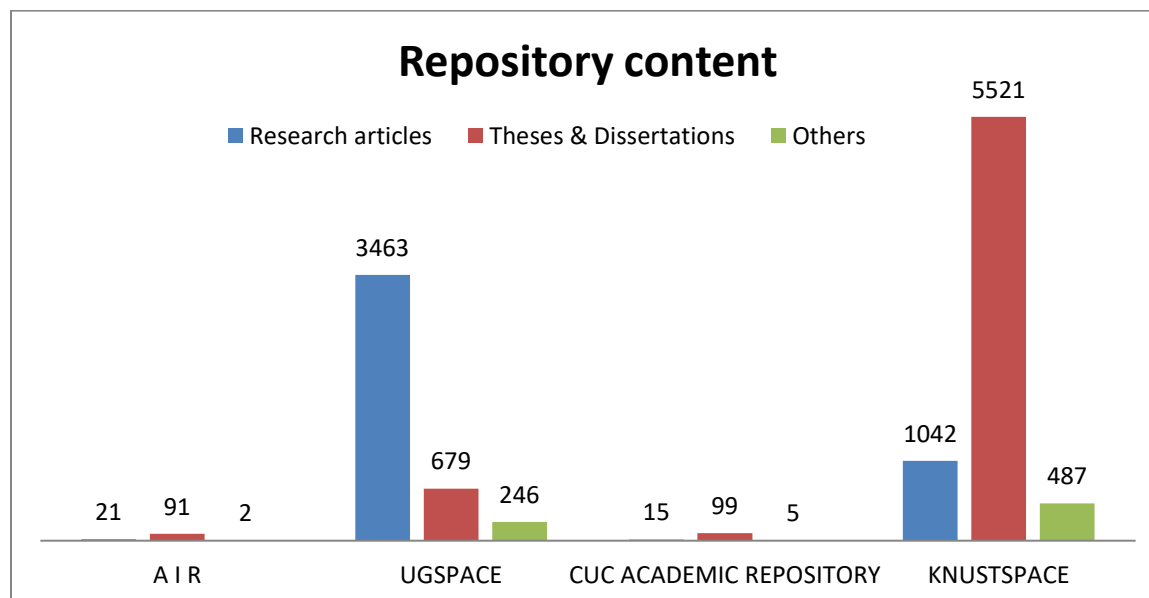**Repository creation and content population**

D-Space, an open source software, was used to develop the repositories of all the repositories under study. Enough internet bandwidth had been apportioned to the servers of the respective repositories under study, often residing on a 155mb internet backbone, with the original D-Space software having been modified to accommodate local issues (AS 3, CU 1, KN 5, UG 6). With the exception of Ashesi University College, the Dublin Core format is used to generate the metadata for the

contents of the repositories which largely include conference papers, electronic theses and dissertations, lecture notes and examination questions, university publications and supplementary e-books (AS 1, CU 3, KN3, UG 2). For instance, according to a respondent from KNUST:

> *"KNUSTSpace was created using the D-Space software because it is open source software which is more preferred to proprietary software in open access initiatives. The metadata is more of the bibliographic details of the document. "We have the title, author, record number, format and these serve as the document surrogates which lead the user to the actual document being sought after. Since the repository is registered with ROAR, OpenDOAR and Google scholar, the metadata serves as the conduit for the contents of the repository to be harvested" (KN 5).*

Managers of the various repositories mostly surf online to detect articles in open access journals authored by faculty and staff of their universities. As stated by this respondent of the University of Ghana, "the digital librarian uses SHERPA-RoMEO to identify journal articles authored by University of Ghana lecturers which are on open access platforms and upload them into the repository since the open access principle does not bar their further or wider distribution or circulation" (UG 6). As could be seen from Figure 1, KNUSTSpace has the highest number of items (7,050) followed by the University of Ghana's UGSpace (4,388). The rest are Central University Academic Repository with 124 items and the Ashesi Institutional Repository with 112 items (AUC; 2018; CU, 2018; KNUST, 2018; UG, 2019). A breakdown of the contents of the respective IRs is shown in Figure 1.

Figure 1: Materials in the various repositories

Source: Field data, 2018

Policies

The repositories of KNUST and UG are governed by written policies. For instance, KNUSTSpace is governed by a 19-paged policy document concerned with the operations of the repository. Broadly, the policy, presents KNUSTSpace as an open-access university-based repository, and it includes guidelines on repository population, access control, preservation and marketing (KNUST, 2008). Similarly, respondent from UG, (UG 6), mentioned that UGSpace's policy document was "inspired by the IR Policy of the University of Cape Coast, KNUST and the Massachusetts Institute of Technology (MIT). The policy document stipulates the expected roles and functions of the various units for smooth operation and sustainability of the repository". A look at the University of Ghana Institutional Repository Policy document reveals that it includes the collaborative efforts expected from the various relevant sections of the university such as ICT, ORID, the Library and faculty (UG, 2018b). Above all, the UGSpace policy addresses the rights

and responsibilities of other members of the academic community with respect to content submission and access to the repository content (UG, 2018b).

The situation is however different at the two private universities AUC and CU. They do not have any written policy document guiding the operations of their repositories. For example, a respondent at CU intimated as follows;

> *"there is no formal policy guiding the operations of the repository. Neither is there a general ICT policy for the university. Therefore, issues of ownership, copyright and intellectual property rights are discretional" (CU 5).*

Issues of intellectual property rights, which need to be addressed for lecturers to safely contribute materials, have rather received little attention as shown by the following responses:

"These lecturers have, over the period, been submitting and publishing their articles with the established journals. They simply have had no problem giving away all their rights to these publishers. Therefore, if we want them to submit their works to us, then we simply have to reorient them" (KN 3). To another, "it is not that we lecturers don't want to bring our materials, but I for instance don't want to be the subject of any legality. Therefore, if they want my published journal article, they can deal directly with the journal publishers. I don't see how I can negotiate my Intellectual Property Right for a commercial publisher and my institution at the same time" (CU 5).

However, certain issues such as withdrawal of materials and access control are very forthright. As a responsibility, the repository manager checks copyright and propriety or worthiness of a document before being uploaded as indicated in the following responses by AS1:

> *"The repository of the Ashesi University College is governed by an unwritten or 'as and when policy'. The librarian, as the immediate custodian of the repository,*

often serves as a constant reminder to all actors to ensure a smooth operation of the repository. Only dissertations that have been graded and scored 'Grade C' or above are admitted into the repository. Such dissertations are first submitted to the courseware before library staff do the onward uploading into the repository with the metadata assigned. This is a mechanism instituted to check and affirm that whatever ends up in the repository has been well-vetted. Faculty publications are also verified to avert any copyright infringements" (AS 1).

Preservation and security of repository contents

A very simple preservation process is followed in order to ensure the longevity of the repository contents under study. It was revealed that, "largely, when a newer version of the PDF software emerges, the life of the document is intervened and migrated onto such versions to make them accessible over time" (UG 6).

Also, as demonstrated by a respondent from CU, "contents of the repository are backed up at secure locations so that in the event of any irreparable damage to the operational repository, there would not be prolonged interruption in access" (CU 5). In the University of Ghana, "there is a University Archives outfit managed by a professional archivist. As such, the expertise of archival professionals is brought to bear concerning the preservation of the digital repository contents" (UG 1). Throwing more light on University of Ghana's collaborative nature of their preservation strategy, UG 6 suggests that "what the team of digital library and archival staff do is to identify the fragility of the various digital resources and determine the appropriate preservation strategies for each category of documents" (UG 6).

As exists in Ashesi, "the dissertations in MS Word format submitted to CourseWare (a learning management software) are first converted into PDF. Also, faculty publications in print format are

scanned and converted to PDF. After such documents are uploaded into the repository with their metadata, the documents are monitored to ensure that they are always compatible with new upgrades of the software used in their creation" (AS 3).

In the Central University, "we have a redundant version of the repository, which is a slave to the operational IR. As such, when the operational IR (master) goes off, the slave or redundant repository automatically comes on stream. However, they are all on one server at Miotso Campus so any catastrophe which might affect the server will disturb the operations of the entire repository if not damage it completely" (CU 1).

A key respondent responsible for technical issues at KNUST reiterated that:

> *"An incident that ever obstructed the smooth running of KNUSTSpace was a power outage which led to the crushing of the entire system. As a result of this, another look was taken at the security of the repository. But currently, the server is at our network operating centre and since it was moved there, we have not encountered any challenge. One great lesson we learnt from this incident was to back up the contents of KNUSTSpace at a secure location. Attention has not also been lost on the long-term access to contents of the repository. "In order for access to the contents to be perpetual, the documents are often migrated onto the current versions of PDF software. Even though this often is a cumbersome process, it is the only sure means to ensure the longevity and accessibility of the contents" (KN 5).*

Challenges

The rate at which materials were submitted for uploading into the repository was generally not encouraging in all institutions. "Other materials which emanate from the institution such as research data sets, audio-visual materials, power point presentations, course outlines and lecture

notes have not been included in the repository" (UG 6). Also, a respondent from Central University, CU 3, reiterates that "there is this overarching challenge of difficulty in getting buy-in from the campus community". Affirming this stance, KN 1 posits that "even though the library believes it is doing a lot of publicity, the trickle-down effect is yet to be felt since the involvement of some key personalities for any promotional programme to be effective is missing. The library outfit alone is unable to handle such an obligation successfully".

Another key issue had to do with the lack of decentralization of the activities culminating in the operations of the repositories, especially material submission. In almost all the study sites, the outfit of the library had to intervene in the processing and uploading of materials into the repository. This led to a great burden on the outfit of the library. In most cases, the problem comes about, as suggested by KN 7, "due to the fact that content generators have not been taught how to independently submit materials, or don't have the permission or are not keen on doing it themselves".

In the view of a respondent, "the rate at which contents have been added to the repository has not been very satisfactory". There is actually no zeal on the part of lecturers to deposit materials into the repository. They often need to be reminded" (AS 3). Another respondent testifies that, "even more worrying is the fact that sometimes, the CD supposedly containing the soft copy of master's thesis turns out to be blank or contain videos or music tracks" (UG 5).

Also, in the words of a respondent,

> *"a key psychological issue that confronts us in our bid to secure materials from lecturers for submission into the repository is when we are questioned about our mandate. Sometimes, you go to a lecturer and he asks you, 'what obliges me to give*

my own publication to you?' I believe there should be some administrative order

encouraging or compelling lecturers to deposit materials into the repository, probably

as part of their conditions of service" (UG 3).

Following in this same path, a respondent believes that "it could be stated in the appointment letters of new faculties that they have to submit materials into the repository. This is one sure way of getting more of research articles" CU 3).

Furthermore, erratic power supply affects the operations of the repositories especially when the alternative power is unavailable at the Network operating Centres which host the repositories. This is a common situation in all the campuses. For example, a respondent from KNUST, which seems to be the hardest hit institution, surmises that "these days, the power situation is so unreliable, and this seems to affect everything. Our repository is not insulated from this problem. It makes it very fragile" (KN 3).

Of more significance is the fact that some equipment or tools which are necessary for the smooth population of content and running of the repository are lacking. For instance, a respondent of the Central University posits that, "a scanner is much needed to digitize the print version of materials. Unfortunately, the university does not have a high speed scanner that could be used for this project. Coupled with this is the difficulty in getting materials to populate the content of the repository" (CU 2).

Material submission is also not at an enviable level. "The truth is we are only doing up to 30% of what is expected of us. Ideally, the repository should include research data, power point presentations. We don't get such materials and this has affected the anticipated rate of populating the repository content" (KN 5). "Our effort is not getting the top support. Our community is such that you need to get some top people to be personally interested (KN 3). This same issue is

bemoaned by a respondent: "there used to be open access week but I think now it has died down. I don't think it is there anymore" (KN 7).

Sustainability

In the wake of these challenges, the repository comes with several benefits. One key benefit that the repository has provided is about uplifting the image of the institutions in terms of global visibility through the showcase of its intellectual output. This seems to be the observation of many respondents.

"Our students' theses are recognized and some of them are even approached with publication offers" (AS 4). The repository is even more strategic in the next decade journey of Ashesi University which is a focus on faculty research. Specifically, to the library, "the repository has brought us an avenue to improve our digital service provision" (AS 1). It is on the heart of the many concerned for AIR to be sustainable over time that in actual fact, "a lot of opportunities exist for the IR hence a lot more of faculty should be involved to increase deposit and usage" (AS 6).

As a sentiment shared by many others, a respondent from UG strongly defends the opinion that "if nothing at all, the University of Ghana is doing very well in world university rankings and the UGSpace definitely is part of this success story. If you consider the daily view and download rate of items in our repository, then you would realize that people are really getting to know us" (UG 2). Most respondents are therefore of the belief that the repository concept will continue to exist in so far as its benefits far outweighs the cost. As stated by this respondent, even though the cost of setting it up and maintaining is so much, what the repository does for the university is immeasurable (CU 5). However, respondents were quick to point out that the sustainability of the repository will not just happen simply because it is a good thing. They believe, as stated by this respondent, that "this thing needs support from every part of the institution. From top to down, the

VC, the lecturers, the IT guys, I mean everybody. It is now more or less one of the symbols of this university" (UG 7).

DISCUSSION

Libraries across the world have been considering a more cost-effective means of developing their collections as a result of the disadvantages associated with the existing publishing system (Carpenter et al, 2011; Glenn, McGuigan, & Russell, 2008). This trend of relying on online open access platforms is not so different from what pertains in the four institutions engaged in the study. The libraries of the study areas are now actively involved in the scholarly communication process by leading academics to share their scholarly findings with the rest of the world through open access. Some mutually-beneficial outcomes have been adduced for this initiative, as some content providers revealed of increased citation and invitation to publish in some journals. This trend is in sync with Dulle and Minishi-Majanja (2009) and Priti (2011) who found out that authors benefit in enhanced visibility of their research from online publishing emanating from broader dissemination and increased use.

With all of the repositories studied having unrestricted access to the showcased contents, it emerged that wider distribution or sharing and preservation of the intellectual output, as well as the projection of the image of the academic community were the main purpose for establishing the repositories. In contributing to the discussion as to why institutions are adopting the repository concept, Giarlo (2005) is of the view that even though this approach to scholarly communication has some challenges, open access institutional repositories present numerous opportunities. It is the view of Grundmann (2009) that institutional repositories are much appreciated for providing a faster route to scholarly and research work.

All the institutional repositories studied were in the operational stage. This outcome is different from a study by Corletey (2011) where it emerged that most institutional repositories in Ghana were at the pre-operational stage, with the fully functional ones being those of public universities (KNUST and UG). This difference could be attributed to the fact that his study was done quite earlier when the repository concept was newly embraced.

Planning and collaboration

To Lynch (2003), an effective institutional repository includes collaboration among librarians, information technologists, archivists and records mangers, faculty, university administrators and policymakers. From this study, it was realized that the three constituencies which drove IR development on the four campuses were content generators, implementers, and users. Content generators comprised students, lecturers and administrative staff who are authors or originators of scholarly and administrative materials respectively. The implementers were librarians often supported by the IT outfit. Finally, the users included students, faculty, administrators and all members within the campus community and beyond who access or download materials in the repository for different purposes.

It has been observed that often in the initial planning and development of most repositories, key stakeholders such as university administrators and faculty are left out (Campbell-Meier, 2008). Jain (2012) observes that around the world, institutional repositories are mostly hosted within academic libraries. The situation is rather different in this study. The implementers of the various repositories believe that the repository success is not dependent on software and standards alone, but as to whether, and how the campus community will accept the concept. In the case of all the repositories investigated, the library and IT units directly dealt with the technical issues of repository development, and as well, collaborated with others such as the public relations and

faculty to publicize the IR. This portrays that however limited it was, there were some levels of collaboration with the significant units of the institutions in some key activities of the repository. This is in sync with Ashworth (2006) who claims that since on different campuses, different people assume different responsibilities relating to an institutional repository, it behooves on libraries to know about the principles, benefits and operations of repositories in order to promote, and act as their evangelists. It is again in harmony with the stance of Moahi (2009), that developing repositories requires an understanding of the "existing human landscape" in the form of the organizational climate (culture, policies, governance issues, politics and goals).

Repository creation and content population

In all the universities, D-Space, an open-source software developed by Massachusetts Institute of Technology, was used in the creation of the repository. This software was considered very potent in supporting open access initiatives (which was the bedrock of all the repositories). Coincidentally, majority of institutional repositories worldwide have been created with open source software. This is attributed partly, according to the Directory of Open Access Repositories (DOAR, 2014), to the fact that open-source software is compatible with the ideology of the freedom and independence of the internet from commercial interests. Bailey et al. in 2006 established that DSpace was the software of choice of the repositories of 123 Association of Research Libraries (ARL) member libraries in the US due to the availability of technical support, increased visibility, interoperability and its ability to support different formats of content. The Dublin Core Standard was followed in generating the metadata of the documents in three of the four institutions.

Ideally the contents of a university repository include pre-prints and other works-in-progress, peer-reviewed articles, monographs, enduring teaching materials, data sets and other ancillary research

materials, conference papers, electronic theses and dissertations, and gray literature, as indicated by Johnson (2002). Content recruitment in IRs is not very uniform because different repositories enumerate different digital documents (Lynch & Lippincott, 2005; Shearer, 2004). The Directory of Open Access Repositories (DOAR) in 2014 revealed that the contents of Western European IRs depicted a balance between journal articles and theses whereas IR contents in Africa and Australia largely contained primary data.

When juxtaposed with this study, there was much concentration on thesis and dissertation followed by research articles in the four repositories studied. In all, there were thesis and dissertations, abstract and full text of journal articles as well as heritage and administrative materials, albeit with differences in the proportions of such contents. Although contents in the repositories vary from institution to institution, electronic theses and dissertations remain a common feature of the contents, serving as the base collection in all the institutions studied. The existence of electronic thesis and dissertations in a repository reposes the trust of students and new members of faculty about the use of repository for scholarly communication and wider sharing. That is, students mandated to publish dissertations within a repository are likely to publish in same as faculty members especially if they enjoyed the open access benefits.

Again, the repositories of the two public universities (KNUSTSpace and UGSpace) belonged to a larger cooperative of repositories worldwide. Belonging to larger cooperatives often leads to a higher level of interoperability and thus translates into both local and international traffic. According to Lagoze et al (2001) and Lynch (2001), the issue of interoperability becomes easy after identifying and choosing the right software since many of the software have been created with a strong focus on repository integration, storage and preservation, as well as stewardship and dissemination of scholarly publication. It was therefore not surprising that the DSpace software

was used by all four institutions, as it is seen to facilitate the management of multidisciplinary content (Bailey et al, 2006).

Policies

Policies or lack of it determine the success or failure of institutional repositories. Repositories that have been able to stand the test of time are always guided by policies that stipulate and address very relevant issues. The content and rate of population of the repository as well as the marketing and use of the repository demand that all members of the campus community are involved. The only way to move the campus community along is when there is a binding policy.

The existence of repository policy also strengthens the authority of the repository managers since their mandates will be drawn from the document. Policies also clear doubts and address some sensitive issues such as copyright or intellectual property rights. From the study, the operations of UGSpace and KNUSTSpace are backed by comprehensive policies which address the various foreseeable issues. Both institutions have their IR policies modeled on other universities in Ghana and outside of the country. The two private universities – Ashesi University College and Central University – on the other hand, operate their repositories with unwritten policies. To this end, some officials at these university libraries and the ICT have been assigned greater levels of responsibility and power to oversee the IR operations. Both institutions are considering putting up policy documents in the shortest possible time. In fact, in all the universities, whether there was a written policy or not, matters concerning how the repository should run, and which outfit or individuals should perform which responsibilities in each institution had all been agreed in the initial collaborative meetings.

It must be pointed out, however, that the mere existence of a policy does not translate into implementation. For example, issues of Intellectual Property Rights (IPRs), which are very

significant in so far as populating the repository is concerned, have not been given much attention in the study areas even though such issues exist in the policies of the institutions. There was seldom any structured programme to engage especially academics to address how they could negotiate their IPRs in order for their published peer-reviewed articles to be eligible for uploads into their institution's repository. But the point, as revealed by Bjork (2004), is that authors are willing to give away their copyright in exchange for 'peer-review, quality labeling, marketing and disseminating services of the publisher. In return, the author gains improved recognition in the academic field and career advancement. This situation suggests that a serious attention needs to be taken at IPR issue. Workshops and other "mini-conferences" on the changing scholarly communication model, the open access movement or educating faculty on related IR issues such as copyright, publishing processes, and citation analysis to draw attention to larger issues facing higher education are also useful. It has been established that by capturing the attention of faculty with these issues, many opportunities unfold to highlight the value and use of the IR in a broader context (Ramirez & Miller, 2011).

Challenges

In a study by Corletey (2011), it emerged that most of the challenges that Ghanaian institutional repositories were facing were very technical such as poor connectivity, low bandwidth and a lack of skilled personnel. These were a common feature of repositories trying to take off after their creation. In this study, it emerged that the fulcrum of the challenges of the repository was about getting the involvement of the broader campus community to participate fully. Meanwhile, it has been observed that to change the current structure of scholarly publishing requires a buy-in of key stakeholders such as faculty, librarians and publishers (Ming, 2000; Johnson, 2002). As the Diffusion of Innovations Theory postulates, early adopters are very crucial in the success of any

new innovation (Rogers, 2003). As such, bringing on board respected campus officials such as the Vice Chancellor, the Provost and the University Registrar would make them champion the course of the repository to the entire campus community. Moahi (2009) believes that doing this implies understanding the "existing human landscape" in the form of the organizational climate (culture, policies, governance issues, politics and goals). Hence, the study agrees with the assertion of Chan et al (2005) and Moahi (2009) that the real pivot of sustainable repositories are not the technical issues but rather the cultural change necessary for it to become embedded in the activities and normal behavioural pattern of the campus community.

Also, the rate at which materials were submitted for uploading into the repository was generally not encouraging in all institutions. Other materials which emanated from the institutions such as research data sets, audio-visual materials, power point presentations, course outlines and lecture notes were not included in repositories under study. This challenge stems from the overarching challenge of the difficulty in getting total buy-in from the entire campus community.

Even though the materials in the repository are mainly textual and thus require very simple preservation strategies, preservation and security of digital materials still require the existence of a well-thought out plan to forestall any future eventuality. Unfortunately, in almost all the repositories, there were no existing preservation policies. It is incumbent on any approach at guaranteeing preservation to first consider the formulation of a preservation policy which prescribes the strategies for preserving IR contents and the decisions about which content requires short, medium, or long term preservation. Aspects of collection policies such as selection criteria and submission guidelines could be incorporated into such preservation policies.

Another key issue had to do with the lack of decentralization in, especially, material submission. In almost all the study sites, the outfit of the library had to intervene in the processing and uploading of materials into the repository. This led to a great burden on personnel. The problem comes about as a result of the fact that content generators have not been taught how to independently submit materials, do not have the permission, or are not keen on doing it themselves. It is believed that since the tenets of institutional repositories are stimulated by librarianship techniques, librarians will help remove barriers, simplify the process of material submission and also, be visible in the training of students, faculty and other stakeholders to contribute content and as well, use the repository (Walters, 2007; Jain & Bentley, 2008; Moahi, 2012).

Again, load shedding or power outages also militated against the smooth operations of the institutional repository. Its impact is such that without any other alternative source of power, the operation is halted and the repository goes offline.

RELATIONSHIP OF THE FINDINGS TO THE THEORETICAL FRAMEWORK

The Diffusion of Innovation Theory was the underpinning theory of the study. The institutional repository concept is an innovation that continues to be diffused across space and time in most academic communities (Rogers, 2003). As an innovation, it could be generally concluded that the concept has been embraced in many academic institutions across the world (Pocket Guide, 2005). It is therefore not surprising that universities such as Ashesi University College, Central University, Kwame Nkrumah University of Science and Technology and the University of Ghana have respectively developed their repositories.

In the respective repositories (AIR, CUAR, KNUSTSpace, UGSpace), the main actors in this diffusion process are library and IT staff, faculty, students and university administrators. The

library and the IT mainly generate the idea through a platform or bedrock funded by the university administration from where the innovation is made available to students and faculty who also provide the innovation with the raw materials. Rogers (2003), puts the adoption of an innovation into five categories as: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. In consonance with Swanepoel (2005), Campbell-Meier (2008) and Corletey (2011), the analyses from the various campuses depict that they are at the early adopter stage of the IR idea.

The Diffusion of Innovation Theory postulates that before members of a community would totally adopt a new technology, idea or concept, they need to be fully convinced that it has higher advantages over the existing one (Rogers, 2003). This is about convincing the various campus communities about the superior ability and advantage a repository has over existing avenues of sharing and preserving digital content as well as projecting the image of the university. However, no form of formal assessment of the interest of the campus community was done prior to the creation of the repository in all universities even though the planning processes involved collaboration with major stakeholders. Another significant issue had to do with the non-existence of a well-structured communication channel to further diffuse this innovation. And after the repository had taken off, there were no kind of unified assessment measures except occasional voluntary feedbacks and the usage tracking system.

However, Campbell-Meier (2008) is of the view that change takes time, and involving stakeholders such as campus administration and faculty early in the process will provide early identification of potential problems. For Starkweather and Wallin (1999), since the current scholarly publishing outlets serve the needs of some faculty, they may not participate in the IR concept unless they believe it really serve their needs. The solution lies in involving all the actors within this system

right from the initial stages of the IR development in order to attain complete adoption of the novelty (Rogers, 2003).

CONCLUSION

It can be concluded, based on the findings of the study, that academic institutions in Ghana see the worth of online digital institutional repositories in advancing scholarly communication and preserving intellectual and administrative or heritage materials. For this reason, these institutions are gradually building their repository collections using theses, dissertations and research publications as the base materials. Conspicuously missing is the needed involvement of key personalities on campus to create a wider acceptance of the concept by the general university community. The institutional aspect of the repository leaves much to be desired. The lack of involvement of these prominent individuals has led to other problems such as low rate of material deposit and a low access rate. This calls for more concern, especially because the two public institutions engaged in the study (UG and KNUST) happen to be the oldest and largest universities in terms of student/staff population and academic programmes also faced such challenges. Thus, many other universities may look up to them in following the path of repository development.

RECOMMENDATIONS

Based on the findings and conclusion, the study makes some recommendations with the proposed actors to carry out such initiatives.

The existing trend was that the repository had become operational before the birth of a policy document, instead of the other way round. In some institutions, there was no policy at all. Much as it is recommended for the two universities without repository policies to consider formulating them, a policy will remain a mere document unless its implementation is done in a manner that

brings about the desired change. Repository policies should marry the existing library and ICT policies and accommodate the broad vision of the institution. This will lead to total ownership of the project by the campus community. A good policy will ultimately cater for content population, copyrights, marketing and awareness creation, preservation and usage. This is why even though the library may take the lead, it is still essential to involve the cross-section of the university in formulating the policy in order to make the operations smoother.

The drive to increase the repository content could be approached in different angles. In the first place, the existing print theses should be digitized as a massive project by procuring high capacity multi-purpose scanners and the soft output subsequently deposited into the repositories. Again, faculty should be impressed upon by university authorities to publish in high impact open access journals for the purpose of onward upload of such publications into the institutional repository. They should again be educated on copyright and intellectual property right issues in order to negotiate to the advantage of their affiliate institutions for further distribution of their publications and image enhancement.

Also worthy of triggering material deposit is the tying of funding for research and conferences to the demonstrable willingness by academics to submit materials emanating from such activities.

Above all, the Consortium of Academic and Research Libraries in Ghana (CARLIGH), which has been championing the many digital initiatives of libraries in the country, should think of instituting a national academic or research repository. This will harness the potentials of the well-endowed and less-endowed academic institutions together by providing a single platform to share the intellectual output of academic and research institutions in Ghana. In doing this, the Committee of University Librarians and their Deputies (CULD) should be encouraged to partner CARLIGH. By so doing, a less endowed university will not have to incur the huge initial capital outlay of setting

up its own repository but just upload its materials into the CARLIGH-managed repository and still achieve the same or even more benefits than if it was to do as a solo project. This is very viable judging from the fact that CARLIGH has been able to bring most academic and research libraries under one umbrella to acquire academic databases for members at a highly subsidized cost.

REFERENCES

Abukutsa-Onyango, M. (2010). *Open access and developing countries.* Accessed November 15, 2017 from: http://www.openoasis.org/index.php

Adeya, C. N. (2002). *ICTs and Poverty: A Literature Review.* Accessed July 28, 2018 from: http://hdl.handle.net/10625/28352

Alemna, A. A. (1998). Information in African society. *Information Development, 14*(2), 69-72.
Alemna, A. A. (2005). *Copyright and access to information in higher education in Africa.* Presentation at the African Copyright Forum, November 2005. Kampala, Uganada.

Ashesi University College [AUC]. (2017). *Ashesi Institutional Repository website.* Accessed on August 4, 2018 from: http://www.air.ashesi.edu.gh

Ashworth, S. (2006). *Role of librarians in the development of institutional repositories.* Accessed July 9, 2018 from: http://www.pfsl.poznan.pl/oa/ppt/2.ppt

Association of College and Research Libraries [ACRL]. (2003). *Environmental Scan 2003.* Shannon Cary et al (eds.). Chicago, ACRL.

Bailey, C. W., Karen, C., Jile, E. et al. (2006). *Institutional Repositories.* Washington D.C: Association of Research Libraries. Accessed July 28, 2018 from: http://www.arl.org/bm~doc/spec292web.pdf

Bailey, C. W. (2006). *Institutional Repositories: SPEC Kit 292.* Washington, DC: Association of Research Libraries.

Bankier, J. G., Foster, C., & Wiley, G. (2009). Institutional repositories: Strategies for the present and future. *The Serials Librarian*, *56*:109-115.

Bankier, J., & Perciali, I. (2008). The Institutional repository rediscovered: What can a university do for open access publishing? *Serials Review*, 34(1): 21-26.

Bjork, B. (2004). *Open access to scientific publications: an analysis of the barriers to change. Information Research.* Accessed November 5, 2017 from: http://informationr.net/ir/9-2/paper170.html

Bryne, M. (2001). Data analysis strategies for qualitative research. Association of Operating Room Nurses, 74 (6), 904-905.

Budapest Open Access Initiative. (2002). *Budapest Open Access Initiative Statement.* Accessed August 7, 2018 from: http://www.soros.org/openaccess/

Busha, C., & Harter, S. P. (1980). *Research methods in librarianship: Techniques and interpretations.* New York: Academic Press.

Campbell-Meier, J. (2008). *Case studies on institutional repository development: Creating narratives for project management and assessment.* University of Hawaii. Ph.D. thesis, Unpublished.

Canada, D. (2009). *Open access and developing countries.* Accessed July 28, 2018   from: http://infosherpas.com/ojs/index.php/openandlibraries/article/view/50/74

Carpenter, M., Graybill, J., Offord, J., & Mary, P. (2011). Envisioning the library's role in scholarly communication in the year 2025. *Libraries and the Academy, 11* (2), 659-81.

Central University [CUC]. (2017). *Central University Central Academic   Repository website.* Accessed on August 4, 2018 from: http://www.dspace.central.edu.gh

Chan, D. L. H., Kwok, C. S. Y., & Yip, S. K. F. (2005). Changing roles of reference librarians: The case of the HKUST Institutional Repository. *Reference Services Review, 33*(3), 268-282.

Christian, G. E. (2006). Open access initiative and the developing world. *African Journal Library, Archives & Information Science 18*(1), 1-11.

Christian, G. E. (2008). *Issues and challenges to the development of open access institutional repositories in academic and research institutions in Nigeria.* Accessed July 28, 2018 from: http://idl-bnc.idrc.ca/dspace/bitstream/

Corletey, A. (2011). *Institutional repositories for Open Access: The Ghanaian experience.* Proceedings of the 14th International Symposium on Electronic Theses and Dissertations, Cape Town, South Africa.

Correia, A. M. R., & Teixeira, J. C. (2005). Reforming scholarly publishing and knowledge communication: From the advent of the scholarly journal to the   challenges   of   open access. *Online Information Review, 29*(4), 349 – 364.

Creswell, J. W. (2009). *Research design; qualitative and quantitative and mixed methods approaches*. London: Sage.

Crow, R. (2002). *The case for institutional repositories: A SPARC Position Paper.* Washington   DC: Scholarly Publishing and Academic Resources Coalition.

Cullen, R., & Chawner, B. (2009). *Institutional repositories and the role of academic libraries in scholarly communication.* Accessed July 28, 2018 from: http://researcharchive.vuw.ac.nz/bitstream/handle/10063/866/conference%20pape

Daly, R., & Organ, M. (2009). Research online: Digital Commons as a publishing platform at the University of Wollongong, Australia. *Serial Review 35*(3): 149-153.

Davis, P. M., & Connolly, M. J. L. (2007). Institutional repositories: Evaluating the reasons for non-use of Cornell University's installation of DSpace. *D-Lib Magazine, 13*(3/4), 1-22.

De Sompel, V. H., & Lagoze, C. (2000). The Santa Fe Convention of the Open Archives Initiative. *D-Lib Magazine, 6*(2), 1-15. Accessed July 23, 2017 from: http://www.dlib.org/dlib/february00/vandesompel-oai/02vandesompel-oai.html

Dicovitsky, R. (2010). *Africa: Despite challenges, developing countries making gains in technology access.* Accessed July 28, 2018 from: http://allafrica.com/stories/201002251313.html

Directory of Open Access Repositories [DOAR]. (2014). *Repositories Country list.* Accessed August 7, 2018 from: http://www.opendoar.org/countrylist.php

DOAJ a. (2011). Directory of Open Access Journals. Retrieved August 7, 2018 from: http://www.doaj.org/doaj?func=byCountry&uiLanguage=en

Dulle, F. W., Minishi-Majanja, M. K. (2009). Researchers' perspectives on open access scholarly communication in Tanzanian public universities. *SA Journal of Information Management, 11(*4), doi: 10.4102/sajim.v11i4.413.

Fernandez, L. (2006). Open access initiatives in India - an evaluation, partnership. *The Canadian Journal of Library and Information Practice, 1*(1), 1-22. Accessed July 28, 2018 from: http://gir.uoguelph.ca/index.php/perj/article/view/110/

Flyvbjerg, B. (2001). *Making Social Science matter: Why social inquiry fails and how it succeed again.* Cambridge: Cambridge University Press.

Fraenkel, J. R., & Wallen, N. E. (2000). *How to design and evaluate research in education (*2nd ed.). Boston: McGraw Hill Inc.

Gardner, J. (2008). *Open access and institutional repositories: issues in today's digital libraries.* Accessed July 28, 2018 from: www.archive.org/details/OpenAccessAndInstitutionalRepositoriesIssuesInTodaysDigital libraries.

Giarlo, M. J. (2005). *The impact of open access on academic libraries.* Accessed November 15, 2017 from: http://lackoftalent.org/michael/papers/532.pdf

Glenn S., McGuigan, G. S., & Russell, R. D. (2008). The business of academic publishing: A strategic analysis of the academic journal publishing industry and its impact on the future of scholarly publishing. *Electronic Journal of Academic Special Librarianship, 9*(3), 1-13.

Grundmann, A. (2009). *Increasing self-archiving of faculty publications in institutional repositories.* Accessed July 28, 2018 from: http://infosherpas.com/ojs/

Hamel, J., Dufour, S., & Fortin, D. (1993). *Case study methods.* Newbury Park, CA: Sage Publications.

Harnad, S. (1995). *Implementing peer review on the net: Scientific quality control in scholarly electronic journals.* In R. Peek & G. Newby (Eds.), Scholarly publishing: The electronic frontier. Cambridge, MA: MITPress, (103 -118).

Harnad, S., (2004). *Fast-forward in the green road to open access: the case against mixing up green and gold.* Accessed July 28, 2018 from: http://www.ariadne.ac.uk/issue42/harnad/

Harnad, S. (2008). *Mandates and metrics: How open repositories enable universities to manage, measure and maximize their research assets.* Accessed July 28, 2018 from: http://users.ecs.soton.ac.uk/harnad/Temp/openaccess.pdf

Harnad, S., & Brody, T. (2004). Comparing the impact of Open Access (OA) vs. Non-OA articles in the same journals. *D-Lib Magazine, 10*(6), 1-7.

Harnad, S. (2010). *Open access archivangelism.* Accessed July 28, 2018 from: http://openaccess.eprints.org/

Jain, P. (2011). New trends and future applications/directions of institutional repositories in academic institutions, *Library Review*, *60*(2), 125-141.

Jain, P. (2012). Promoting open access to research in academic libraries. *Library Philosophy and Practice, 737*(1), 1-13. Accessed August 20, 2018 from: http://unllib.unl.edu/LPP/

Jain, P., & Bentley, G. (2008). *Institutional repositories as a benchmark for digital scholarship.* Botswana Library Association 1st National Conference, 26-28 June, University of Botswana Library Auditorium, Gaborone.

Johnson, R. K. (2002). Institutional repositories: partnering with faculty to enhance scholarly communication. *D-Lib Magazine 8*(11), 1-13. Retrieved July 23, 2018, from: http://www.dlib.org/dlib/november02/johnson/11johnson.html.

Jones, R. (n.d). *On institutional repositories: how they came to be and how they are fitting into the digital library.* Accessed July 23, 2018 from: https://www.arxiv.org.

Kavulya, J. M. (2004). *University Libraries in Kenya: A study of their practices and performance.* (PhD Thesis). Humbodldt University, Berlin.

Kiran, K., & Yip P, C. (2009). *Open access initiatives in academic libraries: Challenge to the user.* Accessed July 28, 2018 from: http://www.ifla.org/files/hq/papers/ifla75/105-kiran-en.pdf

Kwame Nkrumah University of Science Technology [KNUST]. (2008). *KNUST Institutional Repository Policy.* Accessed on August 4, 2018 from: ir.knust.edu.gh.

Kwame Nkrumah University of Science Technology [KNUST]. (2017). *KNUST repository website.* Accessed on August 4, 2018 from: http://www.ir.knust.edu.gh

Lagoze, C., & de Sompel, V. (2001). *The open archives initiative: Building a low-barrier interoperability framework.* Proceedings of the 1st ACM/IEEE-CS joint conference on Digital libraries, 54-62.

Lynch, C. A. (2001). Metadata harvesting and the Open Archives Initiative. *ARL Bi-monthly report, (217), 1-9.*

Lynch, C. (2003). Institutional Repositories: essential infrastructure for scholarship in the digital age. *ARL Bimonthly Report*, (226), 1-7. Retrieved July 26, 2017 from http://www.arl.org/bm~doc/br226ir.pdf.

Lynch, C. L., & Lippincott, J. K. (2005). Institutional repository deployment in the United States as of early 2005. *D-Lib Magazine 11(9), 1-9.* Accessed November 15, 2017 from: http://www.dlib.org/dlib/september05/lynch/09lynch.html.

Ming, D. C. (2000). Access to digital information: some breakthrough and obstacles. *Journal of Librarianship and Information Science, 32*(1), 26-32.

Moahi, K. H. (2009). *Institutional Repositories: towards harnessing knowledge for African development.* Paper presented at the First International Conference on African Digital Libraries and Archives (ICADLA-1), Addis Ababa, Ethiopia, 1st- 3rd July, 2009.

Moahi, K. H. (2012). Promoting African indigenous knowledge in the knowledge economy: Exploring the role of higher education and libraries. *New Information Perspectives, 64*(5), 540 -554.

Neuman, W. L. 2006. *Social research methods: qualitative and quantitative approaches* (6th ed.). Boston: Pearson Education.

OpenDOAR. (2018). Directory of Open Access Repositories. Retrieved July 27, 2018 from: http://www.opendoar.org/find.php?cID=Africa&title=Africa

Pickton, M., & Barwick, J. (2006). *A Librarian's guide to institutional repositories.* Accessed July 28, 2018 from: http://magpie.lboro.ac.uk/dspace/handle122

Pocket Guide to U.S. Higher Education 2005. Retrieved July 24, 2017 from: http://www.educause.edu/ir/library/pdf/PUB2201.pdf

Priti, J. (2011). New trends and future applications/directions of institutional repositories in academic institutions. *Library Review, 60*(2), 125-141.

Accessed July 28, 2018 from: http://digitalcommons.calpoly.edu/lib

Ramirez, M. L., & Miller, M. D. (2011). *Approaches to marketing an institutional repository to campus.* In P. Bluh & C. Hepfer (Eds.). The institutional repository: Benefits and challenges. Chicago, IL: Association for Library Collections & Technical Services.

Rieger, O. Y. (2007). Select for success: key principles in assessing repository models. *D-lib Magazine, 13 (7),1-8.*

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rosenblum, B. (2008). *Developing new skills and expertise to support digital scholarship and scholarly communication.* IFLA WLIC , Quebec, 74th IFLA General Conference and Council, 10 -14 August 2008.

Royster, P. (2008). Publishing original content in an institutional repository. *Serials Review, 34*(1), 27-30.

Sarantakos, S. (2005). *Social research* (3rd ed.). Sydney: Macmillan.

Schopfel, J. & Prost, H. (2013). Degrees of secrecy in an open environment. The case of electronic theses and dissertations *ESSACHESS — Journal for Communication Studies,* 6(2), 65-86.

Schwartz, M. (2012). Directory of open access books goes live. *Library Journal, April.* Accessed July 28, 2018 from: http://lj.libraryjournal.com/2012/04/academic-libraries/directory-of-open-access-books-goes-live/

Shearer, M. K. (2003). Institutional repositories: Towards the identification of critical success factors. *Canadian Journal of Information and Library Science* 27, 89-108.

Shearer, K. (2004). *Survey Results – Summer 2004: CARL Institutional Repositories Project.* Accessed August 15, 2017 from: http://www.carl-abrc.ca/projects/institutional_repositories/pdf/survey_results_2004-e.pdf

Stake, R. (1995). *The art of case research*. Thousand Oaks, CA: Sage Publications.

Starkweather, W., & Wallin, C. (1999). Faculty response to library technology: Insights on attitudes. *Library Trends, 47*(4), 640.

Suber, P. (2003). *Removing the barriers to research: an introduction to open access for librarians.* Accessed July 28, 2018 from: http://www.earlham.edu/~peters/

Suber, P. (2012). *Open Access.* Cambridge, MA: MIT Press.

Swan, A. (2009). Open Access institutional repositories: A briefing paper. *Open Scholarship.* Retrieved July 3, 2018 from: http://www.coar-repositories.org/ activities/support- and-training/resources/

Swan, A., & Chan, L. (2009). *Why librarians should be concerned with Open Access.* Accessed July 28, 2018 from: http://www.openoasis.org/index.php

Swanepoel, M. (2005). Digital repositories: All hype and no substance? *New Review of Information Networking, 11*(1), 13-25.

Tiamiyu, M. A., & Aina, L. O. (2008). *Information and knowledge management in the digital Society.* Ibadan: Third World Information Services.

University of Ghana [UG]. (2018a). *UGSpace website.* Accessed on August 4, 2018 from: http://www.ugspace.ug.edu.gh

University of Ghana [UG]. (2018b). *University of Ghana Institutional Repository Policy.* Accra: University Printing Press.

Walters, T.O. (2007). Reinventing the library: How repositories are causing librarians to rethink their professional roles. *Portal: Libraries and the Academy, 7*(2): 213-225.

Wellcome Trust. (2003). *An economic analysis of scientific research publishing, revised edition*. Accessed July 28, 2018 from: http://www.wellcome.ac.uk/

Xia, J. (2009). Library publishing as a new model of scholarly communication. *Journal of Scholarly Publishing, 40*(4), 370-83.

Yin, R. K. (2003). *Case Study Research: Design and methods*. Thousand Oaks, CA: Sage