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Practical aspects of implementation of institutional repositories in Africa with reference to the University of Nairobi

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Abstract

Purpose – This paper aims to assess practical aspects of implementation of institutional repositories (IRs) in Africa with reference to the University of Nairobi and provide useful guidelines to the issues and lessons learned to the other practitioners.

Design/methodology/approach – The study used cross-sectional descriptive survey design to gather and analyze data that was both qualitative and quantitative in nature. In addition, questionnaires, interview schedule and observation guide were utilized to collect data from the respondents.

Findings – First, the study established that the IR has not been well integrated into mainstream information services of the library. Second, there is lack of awareness on the use of IR as an information resource on the part of students and staff. Third, there is need to integrate different forms of information into the IR including graphics, video and sound to carter for the whole population of users even those with disabilities. Finally, there is need for aggressive or serious rebranding, marketing and promotion of the IR.

Research limitations/implications – IRs are vital sources of information that are increasingly being integrated and utilized in African higher education. Discussion of the University of Nairobi as a case study provides practical lessons, implications and home grown solutions for other institutions of higher learning in the African context.

Practical implications – IR is not only contemporary or emerging source of knowledge, information and communication but also fundamental or basic in institutions of higher learning. Consequently, IR provides excellent opportunities for universities to expand knowledge beyond internal and external learning environments.

Social implications – Being fundamental sources of knowledge, IRs provide and support teaching, learning, research activities, scholarly communications and community services in universities and the society at large. As information and communication hubs, IRs have reinvented the image and role of universities as sources of knowledge in the society.

Originality/value – Universities need to embrace IRs as vital and valid sources of knowledge and learning. Developing IRs without aggressive rebranding, marketing and promotional strategies is not enough for universities, associated institutions plus the information staff, but with prove that the resources are being utilized to achieve organizational goals and objectives.

Keywords Africa, Institutions of higher learning, Kenya, Implementation, Institutional repositories, University of Nairobi

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Introduction and background information

Knowledge is considered as a strategic resource that has to be created, stored, shared and transferred in continuous flow for the advancement of the society. Technological advancement has made it is easy to create and access digital information materials that provide the potential for instant use but are not usually made accessible to many users and remain isolated in the authors' computers (Jain and Bentley, 2008). The authors argue that, first, for more than a decade, academic institutions have struggled with how to manage collective and digital intellectual output that is produced in the knowledge age. Finally, the increasing costs of electronic and print subscriptions from commercial publishers do not allow subscription and it has becoming increasingly impractical and challenging for academic institutions to subscribe to all or even most of the online journals. In particular, scholarly communication crisis has come up owing to these high serial subscription costs and database licenses, which has limited access to research outputs for university students and academics asserts Jain. This result has prompted researchers, university and centre administrators to come up with alternative forms of scholarly communication like institutional repositories (IRs) (Daly and Organ, 2009, p. 149).

International studies indicate that, the development of IRs at academic institutions has greatly increased with the growth of open-source initiatives in scholarly communication and software development (Campbell-Meier, 2011, p. 152). The establishment of IRs has currently become common activity within academic institutions motivated by the ready availability and relatively simple implementation of the number of open-source software platforms and operating systems (Robinson, 2009, p. 133). In addition, a growing number of universities are beginning to require the digital deposit of thesis and dissertation output in IRs (Harnad, 2009 p. 27). Funders' deposit mandates seem particularly important because it targets high-quality research output, thus setting the example for scientific communities as well as academic institutions (Romary and Armbruster, 2010, p. 46).

Empirical studies indicate that Africa has not fully integrated the use of new information technologies. Ezema (2013) attests to this by pointing out that, Africa as a whole is yet to completely embrace new information technologies, although recent developments indicate that researchers in the continent are accepting the new technology in their day-to-day activities. The author further notes that, first, research activities are very low in Africa. Second, it is also true that much of the research publications generated in Africa are highly under-utilized in the global scholarly community. Reason for this is apparently because scholarly publications from the continent lack global visibility (Ezema, 2013).

Contrary to the observations made by Ezema (2013), African universities and other institutions of higher education have made remarkable strides in implementing computerization projects through institutional funding and donor support (Chiware, 2007). As result, Chiware points out that, first, there are various types of information management systems for administrative and academic purposes that are now operational in these institutions. Second, African university libraries have benefited in the process, with many digital projects now being implemented. The author points out the benefits to include: implementation of integrated library automation systems, the creation of standalone databases, digitization of theses and dissertation collections and, lately, the creation of various types of IRs.

In African institutions of higher education, journals published are neither indexed nor abstracted in international abstracting and indexing agencies. Similarly, research outputs in form of theses and dissertations are completed and buried in individual university libraries to the extent that it is only very few researchers in the university community that are aware of the existence of the materials (Ezema, 2013). Moahi (2009) points this out as the greatest challenge in applying knowledge for development in Africa. The author demystifies the notion that knowledge is not generated in Africa and brings to light the fact that several research generated in universities and research centres scattered all over the continent are either disseminated in expensive foreign journals or gather dust in remote places where they were generated. The author further notes that, with low accessibility by researchers in the African region, the publications will be replicated or entirely not be utilized for any purpose. These local contents which African researchers generate on a daily basis need proper management and publication in IRs to improve their global visibility and impact. IRs can provide a means of ensuring that the output coming from Africa is registered and accessible on the internet.

Studies conducted in Kenya indicate that development and implementation of IRs are increasingly gaining momentum in institutions of higher learning. Milimo (2012) points out that, research output should be available, accessible and applicable as the only way to impact on the lives of the millions of Kenyans, and contribute to global innovation systems. In particular, one of the pathways being used to enhance the visibility and accessibility of content from Kenya is through open access to information resources stored in digital IRs adds Milimo. Similarly, Makori (2009) highlights that, academic libraries in Kenya need to integrate technological solutions into mainstream information products and services such as integrated information systems, digital information systems, social computing and networking. Several initiatives are underway in universities and research organizations although the institutions face several challenges such as lack of motivation and incentives as well as absence of institutional policies and strategies to support open sharing of information resources. Several institutions have established or are in the initial stage of developing IRs as exemplified through the:

- University of Nairobi (UoN);
- Strathmore University (SU);
- International Livestock Research Institute (ILRI);
- Kenyatta University (KU);
- Pwani University (PU);
- Jomo Kenyatta University of Agriculture and Technology (JKUAT);
- Kenya Human Rights Commission (KHRC);
- Lake Victoria Basin Commission (LVBC);
- Rift Valley Technical Institute (RVTI); and
- Dedan Kimathi University (DKU) (OpenDOAR, 2014).

Past studies, while empirical, have not been compared to any particular institutions of higher learning or organizations in Kenya. First, the studies do not present information regarding integration and use of IRs in the country, particularly insofar institutions of higher learning are concerned. Second, past studies were done at least two to three years ago. With the study being of technological nature, the time span is long and many things

could have changed within that period. Finally, most of the baseline studies centred on development and implementation rather than on the use of information resources found in the repositories. Against the above background, many institutions of higher learning have not integrated IRs into mainstream information systems as expected despite the importance of the vital content found in these information resources. In addition, baseline studies have concentrated more in the development and implementation of IRs rather than establishing on how the repositories are adopted and used. IR studies in Africa and, by extension, Kenya also reveal that researchers deal with mainly issues related to developmental concerns while crucial aspects of integration and use have not been fully assessed.

Research context

University of Nairobi was started in 1956 with the establishment of Royal Technical College, which was transformed into the second university college in East Africa known as Royal College Nairobi. Royal College Nairobi was renamed University College Nairobi as the constituent college of the inter-territorial Federal University of East Africa. In 1970, the University College Nairobi transformed into the first national university in Kenya and was renamed the University of Nairobi (Annual Report, 2013/2014). University of Nairobi has grown tremendously since then and has established various colleges and campuses within Kenya with over 300 training programs at Doctor of Philosophy (PhD), Master's, Bachelor's, Diploma and Certificate levels. The university student population has grown to 84,000 students at present with 70,000 and 14,000 undergraduate and postgraduate students, respectively. In 2011, the university had some 61,912 students, of whom 49,488 were undergraduates and 12,424 postgraduates. The university has launched several policy frameworks which include the: research policy, plagiarism policy, open-access policy and intellectual property policy. The university has also introduced Module 2 and Module 3 degrees to cope with the demand of higher education in Kenya. Owing to these structures, the university has rapidly evolved into world class institution, and it was ranked number 1 in Kenya and Eastern and Central Africa, number nine 9 among the top 1,000 universities in Africa and 907 among the top 22,000 universities worldwide (Webometrics Ranking, 2014).

The university is committed to open and free access to information and takes responsibility for dissemination for research outputs owing to the fact that it has the largest annual research kitty of Ksh 3 billion. This commitment is rooted in the university's vision and mission undergirded by the core values of innovativeness, professionalism and corporate social responsibility. The library has established the digital repository that provides long-term preservation and showcases scholarly outputs in relation to teaching, learning, research, community service and consultancy. In addition, the library promotes access to information, provides information literacy training and collects and maintains relevant and balanced stock of information resources. The library system comprises the main library and 13 college and branch libraries spread across various campuses of the university. Access to electronic resources is enhanced through expansion of computer laboratories and other access hot points throughout the university. In addition, the library has continuously shown mutual support to the open-access concept by holding successful open day and open access week every year since 2011. The aim of the open forums is to create awareness on

library operations and services and promote access to free global information resources including the IR (UoN Library Portal, 2014).

Statement of the problem

Studies have shown that universities across the world including Kenya generate plenty of scholarly information from research conducted by the faculty, staff and students, but, unfortunately, most of the knowledge produced is only accessible by the academic community and authorized members. Researchers in institutions of higher learning, as well as the general public, cannot reach or use the knowledge and information generated by the universities due to complex organizational policies, timing and geographical barriers. For any university or institution of higher learning to achieve academic scholarly goals and objectives, research is one of the major pillars of development and growth. Most institutions of higher learning have put research as the key driving pillar, although investment in the same remains irrelevant if the results are not disseminated to the public both nationally and internationally. From the introduction and background to the study, there is evidence that universities have put in place digital repositories to showcase research and academic outputs to the world as the source and provider of knowledge useful in betterment of humanity and society. Studies highlight that, most importantly, end-users are vital to the ultimate success of repositories and integration and use (or lack thereof) can affect sustainability. Despite the general recognition of the importance of end-users to the ultimate success of the IR, not much is known about integration and use of the repository in academic institutions. Various baseline studies in the world, Africa and Kenya indicate there are no known reports of actual usage of any IR and, not much is known about the needs of the clients (McKay, 2008).

Purpose and objectives of the study

The purpose of this study was to assess practical aspects of implementation of IRs in Africa with reference to the University of Nairobi and provide useful guidelines to the issues and lessons learned to the other practitioners.

The study sought to:

- Examine practical procedures that are involved in relation to implementation process of IRs in institutions of higher learning.
- Identify institutional factors that influence integration of the IR at the University of Nairobi.
- Examine the perceptions of users towards the IR at the University of Nairobi.
- Assess the extent to which the University of Nairobi is creating awareness in popularizing the use of the IR among the clients.
- Identify the challenges that hinder integration and use of the IR at the University of Nairobi.
- Suggest preferred solutions to the identified problems regarding integration and use of the IR at the university.

Research questions

RQ1. What are the procedures that are involved in implementation of institutional repositories in institutions of higher learning?

RQ2. What are the institutional factors that influence integration and use of institutional repositories at the university?

RQ3. How do the users perceive the institutional repository as an information resource at the university?

RQ4. To what extent has the university gone to create awareness in popularizing the use of institutional repositories among the clients?

RQ5. What are the challenges that hinder integration and use of the institutional repository at the University of Nairobi?

RQ6. What are the possible solutions towards the identified challenges?

Literature review

IRs in Kenyan higher education

Freedom to access and use of information is a human right as enshrined in the Berlin Declaration (2003) on open access to knowledge which states that, authors should allow all users "free, irrevocable, worldwide, right of access to information". The United Nation General Assembly in Resolution 59 (1) recognized the importance of this right and resolved that "freedom of information is a fundamental human right", which is an implication that people have right to access information. In Kenya, the right to information is enshrined in the Kenya Constitution of 2010 Bill of Rights Article 35, where the State has the duty and responsibility to publish and publicize any important information affecting the nation. Baseline studies from government and the private sector indicate that, due to the need to meet donor-funding requirements, the private sector is found to be pre-occupied with meeting certain performance standards. In this endeavour, non-governmental organizations (NGO) and other privately owned organizations publicize research through various means including repositories. The government, on the other hand, initially, was not proactive in advocating for the use of electronic resources for dissemination of information to the masses, but lately, with the current government which is referred to as the "digital government" there seems to be change. Lack of urgency on the part of government entities might explain why the public sector lags behind private sector counterparts in all the research constructs.

IRs have been developed in academic institutions in Kenya as means of providing information generated locally through research to the population and the international community. Several institutions have established or are in the initial stage of establishing IRs, with 11 IRs registered in OpenDOAR as indicated elsewhere. Despite the arguments for significant benefits of IRs for both the clients and the institution, the evidence shown by OpenDOAR suggests that academic institutions in Kenya have been slow to respond. With considerable investment of resources and strong initial advocacy from libraries, IRs have not been as successful as expected.

Rationale for IRs

Repositories serve a variety of purposes. For the institution, the repository can raise the visibility of faculty research, help preserve the intellectual output of the institution, particularly for public institutions and can be an effective way to share research with peers and constituencies. For the producers of the research and the faculty, the repository is a way to disseminate knowledge within the peer community and increase citations to the work. These two major stakeholders, the institution that supports the IR

and the researchers who create the works, have therefore, different viewpoints and needs for how the repository should be structured. In the information environment, repositories are seen as one way to address some of the economic challenges of obtaining access to scholarly works. As subscription costs increase at rates higher than inflation, and libraries and information systems face continuing budget reductions and challenges, open-access repositories helps provide access to research findings. The challenge, however, is still how to identify articles that are available full-text from the IR.

Reasons for setting up repositories vary from one institution of higher learning to another and that wide range of projected benefits has been suggested (Sawant, 2012). Academic libraries benefit from being involved in IR initiatives, and there are implications for scholarly communication. Overall IRs include more open scholarship and demonstrate cultural diversity of organizations through the collections. IRs ensures the availability of open content to the wider audience. This was previously not possible but it helps end the monopolization by vendors. The invention minimizes huge disparities, leading to more equitable information economy. The IR breaks free the traditional boundaries of scholarly information access which is common in universities, provides easy access to information, enhances visibility and the ability to cite publications and also underscores organizations' research growth (Nabe, 2010).

In the University of Nairobi, the major benefit of the IR as observed is to the institution. The IR has made the university's intellectual output visible both nationally and internationally, and, as a result, the institution has been ranked as one of the best performing universities in Africa and the best in Kenya (Webometrics Ranking, 2014). The other implication is the use or non-use of the IR as the information resource. Use is identified as the success factor and can be divided into three sub-categories based on the number of users, type of content used and nature of use (Harnad and McGovern, 2009). The most widely used method to measure the use of the repository is by webometrics. Webometrics show how many hits have been made from the repository and the number of articles downloaded. The more the downloads, the clearer it becomes that the IR is being used. To the researchers whose papers are downloaded, it may mean that they are likely to receive more citations. Despite the lack of studies of IR end-users, several studies have investigated potential end-use of open-access materials and strongly advocate for use of IRs. Many of these studies purport a great deal of interest on the part of potential IR end-users. Bringing together input data, usage and citation analysis from various studies is helpful in giving the picture of how effective the repository is to the stakeholders. These data give evidence that the IR is being used by a variety of users and provides a benchmark of use and growth over time for IR funders and administrators of institutions of higher learning.

Practical aspects of development and implementation of IRs

Setting up the repository is a major undertaking for any institution due to financial limitations and other affiliated issues. Process requires commitment of financial and staff resources establishment and maintenance, well-developed process for establishing the authority and value in the institution and overt public relations campaign in the academic community to persuade individual academics to deposit research outputs (Cullen and Chawner, 2011). There are a number of evidence-based factors which influence successful development and implementation of IRs. Giesecke (2011) points out that, the best practice approach can be viewed as the process or action for dealing with

or overcoming any organizational problem which might occur during the development process. There are a number of organizational-oriented best practices from literature that are perceived to have important roles in facilitating the treatment of human and institutional issues in the development process. More specifically, Gieseske avers the importance of the following eight best practices that have been widely applied:

(1) undertaking realistic project proposals;
(2) assembling a well-balanced project team;
(3) encouraging senior management support;
(4) encouraging user participation;
(5) instituting comprehensive training;
(6) ensuring effective communication;
(7) marketing and promotion; and
(8) identifying who is responsible for the treatment of organizational issues.

A number of authors have identified and proposed irreducible and minimum requirements for development and implementation of IRs. When planning and deciding to establish IRs, certain decisions and minimum requirements need to be taken into account (Nabe, 2010, p. 13). These include:

- repository staff and funding;
- management issues;
- platforms to be used; and
- what marketing techniques.

Empirical studies done in South Africa identified various factors to be considered when setting up IRs such as identifying important role players, addressing issues of resources, evaluating software, formulating policies for the IR, restructuring the library to accommodate change and licensing (Macha and De Jager, 2011). Campbell-Meier (2011) asserts that repository implementers in various case studies mainly involved librarians, although the best approach is to include all other equal stakeholders across the institution and follow the process as shown in Figure 1.

University of Nairobi digital repository: implementation process

The University of Nairobi digital repository was developed and implemented in seven main phases: start up and initiation, needs analysis or assessment, project management, project planning, software installation, implementation and monitoring and evaluation.

Start-up and initiation. The start-up and initiation phase (1-2 months) began the project which was run in small scale but with gradual expansion in scope and institutional participation. With a tangible repository at hand, the library approached the faculty and university administration, explaining and demonstrating what IR is and how the institution will benefit from it. One advantage of starting small is that the investment of resources will be relatively small as compared to a large-scale project, and the library will have more freedom to test the water before moving on. It is at this phase that the project's overall management structure was established with the main duty of outlining strategy for the project and setting up time lines and methods of

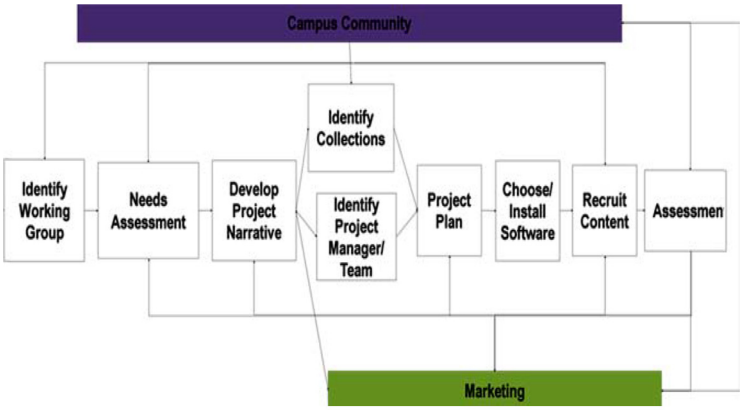

Figure 1.
Innovation-decision process for repository implementers, information professionals and faculty

Source: Campbell (2011)

communication. The working group at this phase was also identified. The project started with a pilot study to obtain experience on data collection, practical digitization, scanner software, open-access software and legal aspects on storing full text documents. The pilot study was evaluated at the end of the project planning phase.

Needs assessment and functional demonstration. Phase 2 of the process largely involved needs assessment and functional demonstration of the system. Work in month's three to eight focused on needs assessment and piloting basic repository functions. These provided demonstration materials for subsequent advocacy efforts, and provided a reference point for capturing user requirements and assessing user expectations. Identifying both faculty needs and interest in scholarly communication provided information that was used to make decisions about software and content recruitment. By understanding the campus community, the implementation team was able to avoid problems plaguing other institutions which include lack of awareness of the IR, and lack of participation in populating the IR with the digital output of the university's knowledge-workers.

Identify project management team, manager and collection. During Phase 3 (9-14 months), the project management team (implementers) established a task force consisting of systems librarian, e-resources librarian, deputy university librarian in charge of technology, deputy university librarian in charge of administration and a student's representative. The task force's charge was to identify the issues involved in creating the IR, evaluate and select the software for hosting the repository and develop action plans. Findings and recommendations including the draft open-access policy were submitted to the library administration committee and the larger university administration, the main decision making body, for approval. Registration of the IR with DOAR, ROAR and the Dspace community took place after the policy approval.

From this team or from without, a team leader or project manager was identified to steer the project on. Issues of concern included service definition, open access, copyright, preservation, metadata standards, digitization and selection criteria. The project team identified the content to be stored in the repository and established working practices. The team also scaled-up the infrastructure as required, continued working with the

established pilot repository monitoring usage and making deposited content available to other university systems. Towards the end of Phase 3, advertisement of the repository's availability and functionality was made, encouraging self-archiving and enabling individual researchers (who have had no prior contact with the project) to directly interact with the repository.

Project planning. Project plan phase (15-21 months) monitored, reviewed and revised the repository services. Operational practices established in Phase 3 were reviewed and refined based on experiences and user feedback. During the early-to-mid part of this phase, it may be appropriate for the university to mandate on the use of the repository. The team started by developing a marketing presentation (which can be customized for specific subject areas), by using marketing leaflets, training material, online help for example on copyright clearance process. It is at this phase that the IR is introduced to rest of the community for example departments, individuals and other interested members of the university. This can be done by hosting open sessions over lunch hour, using organizational newsletters and presentations at meetings and conferences. During these sessions, the team negotiates for submitters of content. In this project, content includes but not be limited to the following:

- preprints and post-prints of journal articles;
- technical reports;
- white papers;
- research data;
- theses and dissertations;
- work in progress;
- important print and image collections;
- teaching and learning materials; and
- materials documenting the history of the University of Nairobi.

During this period, significant increase in advocacy and communication efforts is expected. To further support the uptake of the repository, the universities enhanced interoperability with internal systems and enabled interoperability with external systems.

Capacity and competence development was done through:

- building awareness through workshops;
- staff training and retraining;
- attachments;
- training workshops; and
- study tours where at least two members of the project team undertook undertake a short study tour to advance their knowledge in digital libraries

Choose/install software and content recruitment. Phase 5 dealt with the issue of software programme and content management systems (choose or install software and content recruitment). There are many options for selecting IR software and hosting services today, and the choices to be made should be user friendly and easy to manipulate. Open-source software should be the preferred choice. The main advantage of open-source software is it

provides for flexibility for local customization and feature enhancements. The significant software cost savings is also a consideration, as most libraries do not receive extra funding for IR projects. The open-source software should support OAI-PMH (Open Access Initiative – Protocol for Metadata Harvesting). Two such IR software programs are EPrints and DSpace. With the above consideration, the preferred choice to adopt was DSpace. In addition to installing and turning on the software, branding the repository and identifying collections to incorporate, the team verified copyright, digitized documents and added the appropriate metadata. In addition, a number of design issues were resolved, including how to organize the documents by departments and by document types, and what fields will be required in the metadata.

Project implementation, launching, closure and handover to service. The implementation phase (22-24 months) is sometimes seen as a very disruptive time because this stage is characterized by change. Most likely, the change comes with challenges, and therefore the critical component of the implementation process is the smooth transition from old to new. Indeed, before the new system is placed into production, users must be trained, help materials must be created, databases and repositories must be populated and final testing must be performed. The team must ensure that during this phase, users of the system have ways of providing continuous feedback as problems are found and new issues arise.

The primary focus of this final phase was to ensure the smooth transition of the project's deliverables to a sustainable service. Within each phase, there were multiple development computer entry processes (iterations). Iterations were planned and managed in response to set of prioritized requirements as agreed with the steering group. Assessment and evaluation was conducted at the end of each of the iteration which informed subsequent developments. In the implementation process, there are some issues to be considered. These include: staffing, organizing the repository, document submission and processing, harvesting research output, general resources and human resources.

Monitoring, evaluation and review of the project. Monitoring, evaluation and reviewing of the project is a continuous process done by the management team. Preliminary evaluations were done at the end of every phase with final evaluation of the project before the closure and handing over. Members of the advisory board assessed the quality of IR resources produced and disseminated under this project, reviewed observations by librarians at the institution, considered comments gathered from scholars who used the project's website and document delivery service and examined costs associated with preparation and delivery of electronic information in conjunction with statistics on use of the resources. The board evaluated costs and benefits as well as any systematic problems encountered during the pilot project. The board also has the responsibility of assessing annual progress toward self-sustaining status for the IR. The IR manager organized observations of the advisory board into final project report for distribution to the departments and for mounting on the project web page. The interim evaluations and final report on the project is for the central element of planning subsequent budgets for the project.

Institutional factors

IR as the knowledge and intellectual hub must be supported by the management to ensure successful implementation, adoption, accessibility, visibility and sustainability. Practical aspects of IR implementation include: senior management commitment and

support, effective communication, comprehensive user education and training, marketing and identifying responsibilities for IR management to ensure sustainability.

Management and support. IR development successes have long been believed to be dependent upon the commitment of management. Senior management commitment and support are considered to be the most important factors in planning, development, implementation and adoption of IR projects. In addition, commitment and support of IR projects impact on the institutions' effectiveness in transforming information technology investments into useful outputs. First and foremost, senior management has to ensure that the constant flow of resources is adequate and timely. Finally, senior management creates positive attitudes among other managers and users towards the new IR project (Nabe, 2010). These two points ensure sustainability of the IR and inspire users to adopt the new innovation. Lack of management commitment and support, on the other hand, could result in deliberate resistance by the developers and users, which might result in the abandonment of the IR project.

Effective communication. For the new IR to come into being and actually be used, the institution has to play the lead in fostering excellent communication among all individuals involved in the development process, particularly between analysts and users. Writers note that the success of the eventual system implementation rests on the capability of analysts, users and managers to communicate in meaningful ways due to different interests and expectations from the system. Effective channels of communication should exist to overcome any differences. Negotiation more explicitly recognizes the durability of the differences and achieves solutions through bargaining. Organizations should encourage effective communication between stakeholders (managers, IR developers, and users) throughout the systems development process.

Education and training. One of the major challenges facing digital projects in African higher education has been the readiness in terms of skills and knowledge to implement the digital and electronic services (Chiware, 2007). Similarly, Rosenberg (2006) notes that skills in e-resources management, e-services development, full text digitization and teaching skills are lacking in African university libraries, and hence the need for education and training. The justification for training to design, implement and manage digital projects and electronic library services in African institutions of higher learning are varied (Bawden *et al.*, 2005). Training must cover nearly all aspects, from understanding the current state of affairs in Africa, to the skills and techniques required for implementing and managing digital collections (Chiware, 2007). The author further points out that, it must also cover the processes of collection development and management and to making digital collections accessible to the academic and research communities.

Training of staff in African university libraries can either be through continuing educational programmes or formal training in library and information science and computer science schools (Chisenga, 2006). Given the pace of developments in digital library projects and electronic information services provision on the African continent, it is important that management in African university libraries come up with sustainable solutions to training. This will aid in averting brain drain from the continent which has continuously posed threats to knowledge creation and its management in the African higher education. Solutions such as building of collaborative links for skills transfer with Africans in the Diaspora must be found.

Chiware (2007) avers that, there is increased demand for librarians with adequate training and skills to initiate manage and participate in digital library projects. Adequate training needs sufficient financial and time support in addition to being the responsibility of the institution to ensure clients and staff are educated on the new technology to enhance its adoption and use in African higher education. Lynch (2003) expressed fear that, without commitment from tertiary institutions to teach staff and students to use IRs, the repository will not achieve sufficient usage to warrant existence. Regarding the role of reference librarians in IRs, Bailey *et al.* (2005) pointed out that, the amount of support required for IRs is often underestimated and the need to provide user education, promotion, metadata creation and preservation is often overlooked. Similarly, Bell *et al.* (2005) commented that, on its own, the open archives initiative protocol for metadata harvesting would not create sufficient usage of IRs, and that librarians will be required to teach staff and students how to access the content of repositories. Allard *et al.* (2005) believed that, even though librarians are not necessary for the IR to function, the information staffs are needed to educate users about how to access the materials in IRs. Gray (2009) suggests that, subject librarians are in a prime position to educate users about the value of IRs, and promote the information resource.

Many donors like UNESCO, FAO, Andrew F. Mellon Foundation, Carnegie Foundation and Association of African Universities have provided support in the training of librarians to implement digital libraries projects (Chiware, 2007). First and foremost, some African university libraries have established dedicated information technology units in order to address the problem of lack of skills and competencies among librarians. Second, where integrated library systems have been implemented vendor training has always ensured that staff is adequately trained to run the projects. The question, however, is:

Q1. What are the training requirements for this digital age for librarians in African university libraries, and do African university libraries have adequate resources to meet the training requirements for the digital age projects?

Makori (2009) suggests that, information professionals in academic libraries can master the use of information and communication technology (ICT) systems and other competencies through motivation, encouragement and additional training. Good training program before and after the IR is put into operation is therefore important, as this educates users in articulating information requirements and needs. Studies also suggest that, apart from skills, team-building exercises to help members of staff work in the new structures and adapt to the new working practices are important.

Allocation of responsibilities. Most IR projects today are the result of collective action, and the problem of identifying responsibilities for each person can be challenging. When technical problems concerning the system arise, the identification of who is responsible is obscured. Moreover, how and where the problems or errors within the IR in the case of any, is often very difficult to identify. To be able to openly address all issues and find justification for any ignored problem during the system development process, allocation of tasks and assignment of responsibilities among the members of the IR project team should be the preserve of the management of the institution. The institution will also be in charge of restructuring roles and responsibilities according to skills and performance. Macha and De Jager (2011) found out that, the University of Cape Town library management restructured roles and responsibilities of the staff to accommodate the

change that had been be brought about by the establishment of the IR. Existing staff members were offered new roles and new staffs were hired for new roles.

User perception. The understanding of the term "institutional repository" by the user community is quite diverse. The user community varies according to various characteristics. Halder and Chandra (2012) in investigations done on Indian IRs identified that, the humanities and social science researchers are found to have low levels of awareness of the repository but are interested in contributing research work to university repositories and have positive attitudes towards providing free access to scholarly research results. This observation demonstrates that there is need to study the users' awareness of IRs so as to measure local scenarios. In previous research, Halder and Chandra point out that, interviewees described many different ways they first learned about the IR including library workshops, suggestions from advisors, professors, colleagues or university administrators and notices from the university regarding the requirement that students deposit theses/dissertations in the IR. To encourage broader support and generate awareness both inside and outside the library, developing countries have adopted marketing strategies including: branding and then promoting internally and externally. Indeed, it has been suggested that, repository developers should hold meetings within the library and alert the campus community through press releases about the IR. Library administrators should perform further outreach through presentations to department heads, while developers should enter into extensive discussions with multidisciplinary departments to investigate how to use the repository to solve information problems encountered in the units.

Rebranding, marketing and promotion strategy. The marketing of new library resources or services is always essential to spread the word of value added tools to enrich the academic lives of the university community. Faculty involvement is critical to ensure that the systems meet the scholarly needs of dissemination and visibility of the present and future generations. Additionally, it is imperative for reference librarians to engage faculty as change agent role by garnering IR buy-in. Massachusetts Institute of Technology (MIT) DSpace study showed that, the faculty needed to see information regarding the IR at least five times and, according to the California Digital Library study, seven times before the IR registers as a technology worthwhile to pursue (Branschofsky, 2004). Given these baseline studies and anecdotal evidence, librarians must realize that perseverance in pursuing contact with faculty within the IR context is essential to populate the archive.

The biggest challenge of the IR appears to be garnering content. Librarians have to become marketing specialists embarking on a mission of advocacy for the IR. For faculty who are used to the traditional journal peer review process, there are questions raised about the benefits of submitting materials to the IR regarding required time and effort. Reference librarians who have been assigned to promote the IR and train potential users will encounter resistance in the guise of, "there is no reward or incentive, it is not a priority, I have already published my papers where my professional peers have immediate access to my scholarship or I don't have the time". This are often the remarks received from faculty and staff. To counter these concerns, issues about copyright may be voiced at IR presentations. Faculty and students can be enticed to add scholarship into the IR by targeting graduate students working on theses and projects while preparing to graduate and on proactive faculty that tends to gravitate to using new technologies is one promising strategy.

Marketing and promotion strategies lead to continued development, growth and usage of the repository. Solid marketing framework should start as soon as possible, with Kocken and Wical (2013) stating that "before content recruitment can become the focal point of any marketing strategy, librarians and IR managers must build awareness". The importance of marketing for IRs is commonly repeated as the solution for content recruitment, although there exists much less literature on effective marketing for IRs. Gierveld (2006) points out that, IRs are not developed in response to market demand, making the recruitment of content challenging. Common marketing activities found in the literature include the creation of informational brochures and flyers, presentations to faculty groups and using personal academic connections (Fortier and Laws, 2014).

Issues and challenges

In many African countries, the digitization of materials and setting up of IRs have faced serious problems ranging from low Internet connectivity; software and hardware challenges; lack of highly skilled personnel; inadequate power supply; low bandwidth; legal copyright laws; poor funding; lack of organizational infrastructure and policies; project sustainability; and many others (Mapulanga, 2013). In general, major problems that affect integration and use of IRs are explained as follows.

Copyright issue. Campbell-Meier (2011) in a comparative study of various IRs found out that copyright is one of the biggest challenges facing the IR developers in Canada. After digitization of paper-based content, developers are mandated to seek for permission from individual authors before the projects are moved to the repository. Not only is the author's permission needed for submission but also, in some cases, theses require the permission of the authors quoted within the materials. Campbell further notes that, first, Canadian copyright law does not allow for "fair use" of materials for study and criticism and limits the amount of text that can be cited. Second, there are quantitative guidelines in the copyright law, and the librarian working with the theses often requires students to ask for permission to use the content in print and electronic format. Finally, while the librarians figure out how to populate and run the repository more efficiently, there is still need for financial support from the university. Additional resources are needed for marketing and securing copyright permissions.

Document submission. As academic institutions implement IRs, faculty members are also reluctant to contribute. In a survey of directors at the Association of Research Libraries (ARL), two-thirds of the respondents noted that, the majority of faculty members at the institutions were not contributing (Casey, 2012). Furthermore, Schonfeld and Houseright (2010) discovered that less than 30 per cent of faculty in US colleges and universities were contributing to IRs. In addition, studies of IRs in several institutions such as New Zealand's eight universities (Cullen and Chawner, 2011) also reveal some reluctance on the part of faculty to contribute. The other challenge on the part of document submission as argued by Giesecke (2011) is that faculty and other researchers may post files that do not meet quality standards. These files need to be corrected and improved if the institution has to ensure quality repository that others will use. In addition, as identified by Giesecke, the faculty may not know how to describe work in a way that will increase the chances of the article being discovered by search engines like Google. Providing correct key words and expressive abstract can increase the chances of

users identifying and then citing or using the faculty research. Faculty cites a variety of reasons for hesitation to contribute to IRs (Casey, 2012, p. 3). These include:

- learning curve for new technology;
- copyright issues;
- concerns over whether contributing to the IR is equated with publishing;
- fear that low quality of some materials in the repository would taint the research; and
- worries about plagiarism.

Cost element. Establishing the IR is not cost free. Factors that impact costs include the:

- number and type of staff;
- type of technology chosen for the repository;
- services provided; and
- cost of preservation of data.

One of the first decisions for an institution is to choose the type of hardware and software for the project. Open-source software systems provide the institution with the ability to customize the program and develop facilities that meet local needs. On the contrary, it does mean that the institution needs programming and systems staff to run the system. Choosing the commercial software program limits the amount of technical staff needed and customization to be done. Other technology costs include: digitizing content or hardware and software needed for such services, charges for backup systems and digital storage (McKay, 2008). Once the software platform is solved, the institution can determine the staffing needed to run the repository.

Research methodology

Research design

This study adopted cross-sectional descriptive survey of the IR and the clients that aimed at establishing information on integration and use among information seekers. This study design was suitable as it measured phenomenon across the sample representation of the targeted population. In view of this approach, cross-sectional survey method was used to obtain the empirical data and determine the linkages between variables. Quantitative data were collected by administering close-ended questions through the questionnaires. The questionnaires were issued out to staff and students after which data collected were analyzed using excel computer spread sheets and Statistical Package for Social Sciences (SPSS). The numbers generated results that were generalized to the larger population.

Sample and sampling procedures/techniques

In this study, the samples selected were representative of the whole population with salient characteristics. In total, 62 staff members and 4 executive management of the university library constituted the sample frame of the target population while 943 represented the targeted students' population. Sampling frames used in this study included: lists of sections in the library, employees' records and student admission (Table I).

Purposive sampling procedure was used to select the executive library management that included all the four top senior executive staff members. Cluster sampling was used to select students of the Institute of Diplomacy and International Studies admitted in the 2014/2015 academic year totalling 943. Further, 10 per cent of the total population of the selected students (10 per cent of 943), approximately 94 students, was utilized in the study.

Discussion of the findings

Background information of the respondents

The study generated general information on respondent's gender, highest education level and age. This was necessary to validate the responses which helped the study to understand from which level of experience the respondents answered questions. Results indicated that majority of the respondents in the study were male with 54 per cent while female ones were 47 per cent. Age of the respondents determined the predisposition to integrate and use the IR as majority of the users were in the age range between 26-30 and 31-40 years, with 29 and 31 per cent, respectively. This is assumed to be the age when clients are more involved in research activities. Respondents aged below 25 years were 13 per cent, 26-30 years were 29 per cent, 31-40 years were 31 per cent, 41-50 years represented 10 per cent, while 51-60 and above 61 years each were 9 per cent. One concludes that the higher the advancement in age as well as professional growth and development, the higher the chances of integration and use of the IR as information resource. Level of education was important in getting the views and opinions of the students and staff towards the use of repositories in the university. This confirmed the assumption that students and staff in higher levels of education are more interested in research activities which entail the use of current information technologies.

Practical aspects of implementation process

Objective number one sought to examine practical procedures that are involved in relation to implementation process of the IRs in institutions of higher learning. First and foremost, all the respondents held that development and implementation of the IR was important to the university giving varied reasons as analyzed in Table II, p. 19. In interviewing library management involved with IR development, noticeable patterns and regularities of the process became apparent. Preliminary interviews revealed several factors influencing IR development in this study. These included:

- stakeholders involved in the IR process;
- planning, assessment;
- content recruitment;
- policy development;

Table I. Distribution of sample size

Category	Population size	Sample size
Executive management	4	2
Library staff	62	6
Students	943	94
Total	1,009	102

- marketing;
- costs;
- sustainability;
- motivation; and
- perceived benefits.

In a similar study done in South Africa, Macha and De Jager (2011) identified various factors to be considered when setting up IRs. This included identifying important role players, addressing issues of resources, evaluating software, formulating policies for the IR, restructuring the library to accommodate change and licensing. Campbell-Meier (2011) pointed out that, repository implementers in various case studies mainly involved librarians. The study established that, the best approach is to include all other equal stakeholders across the institution and follow the process as illustrated in Figure 1, p. 8.

Institutional factors

Objective number two sought to identify institutional factors that influence integration of IRs at the university. The study found out that institutional factors are directly connected to integration and use of IRs in terms of availing the needed resources. Some of the results as illustrated in Table III, p. 20 rate the provision of facilities and services to be poor. One such service is promotion and marketing of the IR. The results also illustrate that some resources are inadequate. Without adequate resources such as computer hardware and software, it is difficult for the users to access the repository. This then directly ties with the allocation of funds to the university library for better facilities and service provision. In similar studies, Nabe (2010) avers that, senior

No.	Reasons	Frequency	(%)	Valid %
1	Aids in management of information resources (theses and dissertations)	24	23.53	23.53
2	Promotes local content	22	21.57	21.57
3	Enhances institutions visibility	20	19.60	19.6
4	Develops university capacity in terms of research	18	17.65	17.65
5	Supplements other information resources	12	11.76	11.76
6	No reasons given	6	5.88	5.88
	Total	102	100	100

Table II. Rationale for the development and implementation of the repository

No.	Facilities and services	Mean	%	Valid %
1	Personnel for digitization and submission	2.23	74.33	74
2	Adequate computer software	2.15	71.66	72
3	Licensing and copyright issues	2.11	70.33	70
4	Funding	2.05	68.33	68
5	Adequate computer hardware	1.82	60.67	61
6	Education and training of users and staff	1.33	44.33	44
7	Promotion and marketing	1.21	40.33	40

Table III. Essential facilities and services

management commitment and support are considered to be the most important factors in planning, development, implementation and adoption of IR projects. In addition, commitment and support of IR projects impact on the institutions, effectiveness in transforming information technology investments into useful outputs. As a result, it is paramount that, senior management has to ensure that the constant flow of resources is adequate and timely. Finally, senior management creates positive attitudes among other managers and users towards the new IR project. These two points ensure sustainability of the IR and inspire users to adopt the new innovation. Lack of management commitment and support, on the other hand, could result in deliberate resistance by the developers and users, which might result in the abandonment of the IR project.

In addition, the study also sought to find out various roles management played in supporting integration and use of repositories at the university as demonstrated in Table IV below. Results illustrate that the respondents strongly agree or agree with the statements given.

Organizational setting in the area of facilities and services impacts on individual's ability to adopt new information technologies. This is in the case where the ICT infrastructure is poor and the institutional structures are weak and unsupportive. When probed of the avenues of assistance pursued to encourage participation and deposit in the university IR, one executive member of management noted that:

> […] the capabilities of ICTs keep changing requiring library staff to regularly update skills and know-how in order to cope with ICT driven work and new technologies like the IR. Regularly, staff members are trained through workshops and in-house arrangements. In turn, this enables the staff to assist users who are interested in IR and at the same time encourage those who do not use the information resource.

On the same issue, another executive manager had the following to say:

> […] the changing information environment warrants for improvement on knowledge and skills for proper dissemination of information to the users. The university embraces changing technologies and for this reason, usually some of our staff members are send out to attend international workshops convened by bodies like IFLA. Once back, the members are mandated to share the acquired new knowledge with the other staff members.

Table IV.
Role of management in providing support

No.	Role of management	Mean	(%)	Valid %
1	Workshops/training to sensitize staff on the IR concept	4.79	95.8	96
2	Providing leadership role in the setting up of IR	4.61	92.2	92.2
3	Facilitation of IR software training for staff	4.51	90.2	90.2
4	Provide forum for local discussion group to promote common interest in the development and sharing of skills in matters concerning IR	4.01	80.2	80.2
5	Provide leadership role in facilitating education and training of users	2.53	51.2	51.2
6	Facilitate cooperative purchasing of relevant equipment to share costs	2.51	50.2	50.2
7	Facilitate in promotion of the IR at the university and Kenya to enhance awareness	2.25	45.0	45.0

This implies that staff who are in charge of the repository must be formally trained and possess specialized skills.

In terms of abilities and skills, the study using the observation guide noted that some of the library staff lack skills in offering assistance to users of the IR. When probed on the necessary factors for success of IR initiatives at the university and throughout the country, the respondents had the following comments. One senior executive manager argued that:

> […] although workers are occasionally trained within the institution on various ICT areas including the repository, there are no clear laid out policies on communicating and sharing local content. Many times, each institution is left to its own decision on how to handle such data and formulate own policies.

Another executive member reported that:

> […] there are no well-established processes for content collection and storage which could make interaction between staff and users more effective. There is need for national standards for universities to gain level playing field, and thus, create an opportunity for any institution in the country to successfully implement IRs.

User perception

Objective number three sought to examine the perception of users towards institutional at the university. The study first sought to find whether the respondents used the repository as an information resource and the findings showed that 36 per cent of the respondents used while 64 per cent did not use. Similarly, the study using the observation guide sought to establish the extent of use of the IR. Observation and analysis of the recorded hits of repository users with permission from library ICT department in charge of the IR were made. Observations revealed that majority of the users are the international community and users outside the library. The results demonstrated that most library users do not use the IR. The ICT department also illustrated that the most accessed content are the theses and dissertations. This demonstrated that a larger percentage of information seekers had poor perception of the IR. The study demonstrated that potential users who are aware of IRs show stronger tendency to answer questionnaires than those who are completely unaware of the concept. This shows lack of awareness of IRs among members of institutions, hence the urgent need to publicize repositories. Research has also illustrated that, those who are aware of IRs have contributed smaller number of documents. The study further sought to find out whether the respondents had deposited any research work to the repository. From the findings, 14 per cent of the respondents indicated having deposited work to the repository while 86 per cent had not deposited any work. This implies that awareness about the existence of the repository at the university was indeed very low.

From the above, it can be concluded that there is strong need to publicize IRs and encourage self-archiving practices with the user community. In similar studies, Kim (2006) conducted surveys based on sample of 31 professors whose materials were deposited in the DSpace IR of major research universities in the USA. The study found that, all the 31 professors had materials in the institution's IR. In all cases, the library had deposited these materials, although without the professors' knowledge. Institutions of higher learning in Kenya should take the same initiative but must seek permission and agreement from the authors and writers. IR managers should deposit materials on

behalf of faculty as suggested in Kim's (2006) study. If this practice is followed, Kenyan repositories will be successful in terms of content recruitment.

Branding, marketing and promotion strategy

Objective number four was to assess the extent to which the university is creating awareness in popularizing the use of IRs among the clients. The study first sought to find out how the students and staff got to find out about the university digital repository. The study indicated that majority of the respondents (51.96 per cent) learnt about the existence of the repository through the library website, while few of the respondents (1.96 per cent, 2.94 per cent, 1.96 per cent) learnt through bulletin boards, lecturers and university mandate, respectively, as shown in Table V below. This is in contrast to the study where 128 lecturers and researchers participated. The study established how the participants learned of the possibility of archiving publications in the institutional open archives. The highest percentage of respondents (42 per cent) mentioned "colleagues" as the source of learning about the IR. This was followed by 15.60 per cent of respondents who mentioned "information from the library". In this study, "colleagues" as the source of information achieved third position (17.64 per cent).

In terms of marketing and promotion of the IR, respondents interviewed mentioned that mails regarding IR are circulated to department heads in the university. Another respondent mentioned that personal requests are made to faculty asking for post-prints of new papers. This suggested that the management puts some effort in promotion of IR to new members and there were also efforts to encourage current members to use and contribute to the repository. Promotion and advocacy activities regarding IR cited in this study included: presentations about the resource at faculty and administrative meetings, conducting open-access seminars/symposiums and use of promotional brochures. From these activities, it was evident that the respondents were trying to popularize repositories within the limitations of the financial and manpower resources. Developing brochures or handouts is helpful for both librarians and faculty, but larger effort is needed to ensure repository growth. Creating larger stakeholder group during repository development also creates bigger network for diffusing information about the resource. Fortier and Laws (2014) suggest common marketing activities including creation of informational brochures and flyers, presentations to faculty groups and using personal academic connections.

Issues and challenges

Objective five sought to identify challenges and preferred solutions to the integration and use of the IR at the university. Respondents indicated benefits of IRs to include:

Table V.
Source of knowledge about institutional repositories

No.	Source	Frequency	(%)	Valid %
1	Library website	53	51.96	51.96
2	Media	19	18.62	18.62
3	Colleague/friend	18	17.64	17.64
4	Lecturer	3	2.94	2.94
5	Bulletin board	2	1.96	1.96
6	University mandate	2	1.96	1.96
	Total	102	100.00	100.00

stewardship, efficiencies, scholarly showcase, wider distribution and response to the crises in scholarly communication. Other identified implications were visibility and increased dissemination of the institution's scholarship and free, open and timely access to information and preservation of digital content. In addition, other respondents cited benefits to students and education in terms of teaching and learning resources by enhancing lecture notes and research capabilities. These benefits relate to core functionalities and IR's management and funding within the institution as cited by one interviewee. Respondents were also asked in open-ended questions to enumerate challenges encountered regarding use of repositories. The major challenges cited included: poor Internet connectivity, lack of access to computers and poorly uploaded documents. The most cited problem by respondents was the unavailability of the full text of documents.

Possible solutions for the identified problems were given by respondents. The key points mentioned were to avail resources in full text, encourage depositors to give soft copies of deposited content, increase funds for computer software and hardware and improve Internet connectivity in the library to cater for the population of users. Similarly, Campbell-Meier (2011), in a comparative study of various IRs, found out that copyright is one of the biggest challenges facing the IR developers in Canada. After digitization of paper-based content, developers are mandated to seek for permission from individual authors before the projects are moved to the repository. Another challenge is on document submission. In a survey of directors at the Association of Research Libraries (ARL), two-thirds of the respondents noted that majority of faculty members at the institutions were not contributing (Casey, 2012). Furthermore, Schonfeld and Houseright (2010) discovered that less than 30 per cent of faculty in US colleges and universities were contributing to IRs. In addition, studies of IRs in several institutions such as New Zealand's eight universities (Cullen and Chawner, 2011) also reveal some reluctance on the part of faculty to contribute. The other challenge on the part of document submission as argued by Giesecke (2011) is that, faculty and other researchers may post files that don't meet quality standards. These files need to be corrected and improved if the institution has to ensure quality repository that others will use.

Conclusion

- Based on the results of this study, it can be concluded that, the idea of IRs was taken up with interest by many institutions of higher learning, but it was not well followed through after the initial phase of activity as shown by research. As a result, repositories are growing slowly and there is slow rate of integration and use.
- As repositories move into the area of "business as usual" and other priorities take precedence, the initial marketing efforts have faded away and knowledge of the repository is not strong among academic communities as depicted in the study. This should be a matter of concern to institutions unless these resources were meant to manage theses and function as useful to only those who already have knowledge about the IRs.
- Data from surveyed respondents which the study considered to represent the views of staff and students of the university indicate low rates of deposit. The analyzed results suggest that, while the concept of the IR and open access to

research publications has some appeal, the reality of depositing presents barriers to many people. The message that publishing in open-access forums as well as established peer-reviewed scholarly outlets leads to higher citations rates, has not been taken on board by the academic community despite the fact that, for those who are willing to be early adopters, there are clear advantages which include increased citation and scholarly reputation. The study also found user perception and awareness to be a predictor of integration and use of IRs.

- The importance of education and training to create awareness among the clients was an important finding for the university management. These findings suggest that the academic community is not adamantly lagging in the adoption of IRs, but instead focuses on the most effective communication within disciplines. This therefore calls for serious user education, staff training and better marketing strategies on the part of management.

Recommendations

Branding, marketing and promotion strategy

ICT changed and created the modern information resources that can be accessed through the internet and related agencies. The past generation of information seekers may not be well acquainted with this new technology, while the current one or digital may not have the technical know-how. Having new technology like the IR is one thing but ensuring effective integration and use of the same is the uphill task. This indicates the need for aggressive marketing and promotion strategies so as to inform and create awareness among the students and other stakeholders. IRs function as electronic scholarly communication forums, digital libraries and knowledge management systems. For individuals who choose to use repositories, all the three functions are fulfilled. This indicates how vital this resource is to the university and information seekers. Subject to this, there is need for serious promotion and marketing of IRs.

Access and utilization

For academic organizations, professionals, academicians, students and other stakeholders to adopt and use IRs, there must be rules and regulations that should be implemented to guide its utilization. These should include content recruitment guidelines, metadata, copy right issues and nature of content. The open-access policy should not only be in paper work but also to be implemented in the day-to-day operations and functions of IRs in higher education institutions.

Rethinking the role and value of repositories

In developing repositories outside existing academic frameworks, the university management may have ignored past lessons of dominance of scholarly communication patterns within each discipline and overlooked the need to engage with academic communities. The assessment of IR integration and use can only come from a complete rethinking of the role and value of IRs within the framework of the academic community and known patterns of scholarly communication. The case made in this study, therefore, is to increase the value and use of IRs, critical masses of quality content is key. Expanding the role of the repository, integrating functionality with other resources and increasing exposure through collaborative projects are crucial to unlocking the full potential of the information resource.

Recognizing the importance of clients

Indeed, it is important to note that users are one of the important factors of the long-term survival of IRs without which repositories will not have any relevance. There is need, therefore, for cooperative efforts among academics, information professionals and user community to lower the barriers for integration and use of IRs in institutions of higher learning in Africa and Kenya in particular. It is crucial to recognize and appreciate the fact that IRs are mainly about the users and the content rather than simply a matter of technology. It is therefore imperative to understand the demand side of IRs, lest an expensive mistake is made to implement a project that simply has no depositors or users. It is clear that the IR is very powerful idea that can serve as an engine of change for institutions of higher education in Africa, and more broadly for the scholarly enterprises that they support. If properly developed, it advances surprising number of goals, and it addresses an impressive range of needs. Some of the results seem clear, although there are also likely to be a number of unexpected consequences. This is an area where universities need to invest aggressively, but where the institutions also need to implement thoughtfully and carefully, with broad consultation and collaboration across the campus community (with intellectual leadership from the faculty and the information staff working in partnership) and with full understanding that if the projects succeed that will permanently change the landscape of scholarly communication.

Education and training opportunities

In general, there are a number of challenges that institutions face in relation to introduction of new technologies. Education and training of students, faculty and staff is one of those strategies that is indeed very effective in informing and creating long-lasting positive impression of repositories and interventions for challenges. The study provides relevant information on the need to educate users on the value of IRs and address training opportunities.

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Appendix. Questionnaire for postgraduate students

INSTRUCTIONS

Please indicate your response by ticking the provided boxes. For questions that require suggestions or comments, please use the provided space.

Background Information

1. Gender……
2. Highest education level……
3. Age:
   a) Below 25 ☐
   b) 25-30 ☐
   c) 35-40 ☐
   d) 45-50 ☐
   e) 55-60 ☐
   f) 65-70 ☐

Practical Aspects of Development and Implementation

4. Do you think the development of the institutional repository is important to University of Nairobi? In either case explain briefly.
   ……
5. In your opinion, what are the benefits of developing the institutional repository to the university and the users?
   a) University……
   b) Users……

Marketing and Promotion Strategy

6. How did you get to learn about the existence of the institutional repository?
   a) Colleague/friend ☐
   b) Lecturer ☐
   c) Bulletin board ☐
   d) Library website ☐
   e) Internet ☐
   f) Media ☐
   g) University mandate ☐
   h) Any other……
7. Do you use the institutional repository as an information resource? In either case briefly explain.
   ……

Institutional Factors

8. How did you gain information and learning skills on how to use the institutional repository?
   a) Formal training in the library ☐
   b) Seminars and workshops organized by the library ☐
   c) Guidance by other library staff ☐
   d) Informally ☐
   e) Self- instruction ☐
9. How do you perceive the institutional repository services provided by the university management?
   a) Satisfactory ☐
   b) Not satisfactory ☐
   c) No opinion ☐
10. In your opinion, to what extent has the library management supported the institutional repository in terms of the following facilities and services?

NO.	FACILITIES AND SERVICES	EXCELLENT	GOOD	FAIR	POOR
1.	Adequate computer hardware				
2.	Adequate computer software				
3.	Personnel for digitization and submission				
4.	Education and training of users and staff				
5.	Promotion and marketing				
6.	Funding				
7.	Licensing and copyright issues				

Issues and Challenges

11. Kindly enumerate the major challenges you encounter regarding use of the institutional repository in the university.
    ……
12. Please suggest possible solutions to the identified problems.
    ……

(*continued*)

QUESTIONNAIRE FOR LIBRARY STAFF

INSTRUCTIONS

Please indicate your response by ticking the provided boxes. For questions that require suggestions or comments, please use the provided space.

Background Information

1. Gender……
2. Highest education level……
3. Age:
   a) Below 25 ☐
   b) 25-30 ☐
   c) 35-40 ☐
   d) 45-50 ☐
   e) 55-60 ☐
   f) 65-70 ☐

Practical Aspects of Development and Implementation

4. Do you think the development of the institutional repository is important to University of Nairobi? In either case explain briefly.
   ……
5. In your opinion, what are the benefits of developing the institutional repository to the university and the users?
   a) University……
   b) Users……

Marketing and Promotion Strategy

6. How did you get to learn about the existence of the Institutional repository?
   a) Colleague/friend ☐
   b) Lecturer ☐
   c) Bulletin board ☐
   d) Library website ☐
   e) Internet ☐
   f) Media ☐
   g) University mandate ☐
   h) Any other……
7. Do you use the institutional repository as an information resource? In either case briefly explain.
   ……
8. Have you deposited any of your research output to the university digital repository? In either case, briefly explain.
   ……
9. Statements in this question are related to the information demands that would lead you to use the institutional repository. Please indicate the extent to which the statements apply to the use of the institutional repository using the following scale: 3=Very Demanding, 2=Averagely Demanding, 1=Less Demanding.

NO.	INFORMATION DEMAND	3	2	1
1.	Course work and preparation for exams			
2.	Reading to enhance lecture notes			
3.	Class discussions and presentations			
4.	Thesis and writing research proposal			
5.	To be up to date with current information			

Institutional Factors

10. How did you gain information and skills on the use of the institutional repository?
    a) Formal training in the library ☐
    b) Seminars and workshops organized by the library ☐
    c) Guidance by other library staff ☐
    d) Informally ☐
    e) Self- instruction ☐
11. How do you perceive the institutional repository services provided by the university management?
    a) Satisfactory ☐
    b) Not satisfactory ☐
    c) No opinion ☐
12. In your opinion, to what extent has the library management supported the institutional repository in terms of the following facilities and services?

(*continued*)

NO.	FACILITIES AND SERVICES	EXCELLENT	GOOD	FAIR	POOR
1.	Adequate computer hardware				
2.	Adequate computer software				
3.	Personnel for digitization and submission				
4.	Education and training of users and staff				
5.	Promotion and marketing				
6.	Funding				
7.	Licensing and copyright issues				

13. Statements in this question are meant to find out the role of the management in supporting development and use of the institutional repository. Please indicate the extent to which you agree or disagree with each statement in the following table using the scale provided: 5=Strongly Agree, 4=Agree, 3=Neither Agree nor Disagree, 2=Disagree, 1=Strongly Disagree.

NO.	ROLE	5	4	3	2	1
1.	Workshops/training to sensitize staff on the institutional repository concept					
2.	Facilitation of institutional repository software training for staff					
3.	Providing leadership role in the setting up of institutional repository					
4.	Provide forum for local discussion group to promote common interest in the development and sharing of skills in matters concerning institutional repository					
5.	Facilitate cooperative purchasing of relevant equipment to share costs					
6.	Provide leadership role in facilitating education and training of users.					
7.	Facilitate in promotion of the institutional repository in the university and Kenya to enhance awareness					

Issues and Challenges

14. Kindly enumerate the major challenges you encounter regarding use of the institutional repository in the university.

……

15. Please suggest possible solutions to the identified problems.

……..

(*continued*)

OBSERVATION GUIDE

1. Establish the availability of resources to access the institutional repository in the university library:
    - Software (local area network and wireless)
    - Hardware
2. Determine the channels of information that users interact with.
3. Establish the extent of use of the institutional repository:
    - Observation of number of hits in the library ICT department
4. Identify challenges and future of the institutional repository in terms of:
    - Number of computers
    - Abilities and skills of librarians in offering assistance to users
    - How the institutional repository is marketed to envisaged users to facilitate awareness and easy access

INTERVIEW SCHEDULE FOR SENIOR LIBRARY MANAGEMENT

1. What avenues of assistance have you pursued to encourage participation and deposit in the university institutional repository?
2. In your opinion, what are the major issues that affect institutional repository with staff and student's willingness to participate in its population.
3. Please describe the significant successes and obstacles you've encountered in communicating the goals of the institutional repository to the staff and students in the university?
4. What should be the role of librarians in encouraging and facilitating staff and student deposit into the institutional repository?
5. What methods do you use to foster successful integration and use of the university institutional repository? (Probe: Ask about how this relates to openness and increased exposure of the items within the institutional repository, and whether these facets are being used to encourage deposit.)
6. In your opinion, what are the necessary factors for success of institutional repository initiatives at the university and throughout the country?

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