Institutional repositories in Kenya: The case of the Kenya Library and Information Services Consortium member Libraries.

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Abstract

Billions of shillings worth of domestic researches are conducted every year in Kenya, end up in library shelves and office drawers in the institutions and are rarely disseminated. As a result, immediate steps must be taken to share the research output for development. A major recent innovation in research sharing within the domain of libraries is institutional repositories. In 2011, cumulatively of over 65% of libraries in Kenya had embraced or were in the process of establishing digital repositories in their institutions while 35% had not. This study aimed at establishing the current status of institutional repositories in Kenya.This study used Diffusion of innovation Theory (DOI) to develop a theoretical framework to guide the study and mixed method design to collect and analyze data from sample of 111 Institutional repository administrators purposively sampled. SoGoSurvey, an online platform was used to collect and analyze the results real-time as received from respondents. It also presented the analyzed data in tables, totals, percentages, charts and graphs. The findings revealed that the Kenyan Government had a stake for the successes of the implementation of digital institutional repositories since majority of libraries in KLISC were government institutions. The findings also showed that digital repositories were managed by librarians in different library departments and not necessarily digital repository librarians. The high rate of repository managers with other designations was also a clear sign that repository management had not acquired a fully recognized professional status in Kenya. In addition, the results indicated that although majority of KLISC member libraries had established or were in the process of establishing institutional repositories, there were still a sizable number of libraries that are yet to develop institutional repositories.

Key Words: Institutional Repositories, Libraries, Consortium

Introduction

Billions of shillings worth of domestic researches are conducted every year in Kenya, end up in library shelves and office drawers in the institutions and are rarely disseminated. As a result, immediate steps must be taken to share the research output for development. A major recent innovation in research sharing within the domain of libraries is institutional repositories.The innovation has transformed research sharing by making research output visible and accessible to a wider spectrum of research users. In Kenya, there is evidence of different and varied initiatives to develop digital institutional repositories. In 2011, cumulatively of over 65% of University libraries, research libraries, government departments' libraries and other types of libraries in Kenya had embraced or were in the process of establishing digital repositories in their institutions while 35% had not(Otando, 2011). According to McClung (2012), digital institutional repositories are a little researched approach to dissemination of research that could prove to be effective in circulating research in a timelier and less formal way. The study engages with research sharing possibilities by investigating the status of digital institutional repositories adoption by libraries forming the Kenya Library and Information Services Consortium (KLISC). Launched in 2004, the consortium has been the main campaigner and driver of digital institutional repositories adoption in Kenya. To date, KLISC has one hundred and eleven (111) institutional members (KLISC, 2014). KLISC membership consists of universities (public and private), research institutes, tertiary institutions, and the national library among others libraries. KLISC is the largest consortium and perhaps the most successful library consortium in Eastern Africa (Otando, 2011).

Statement of the problem

Research sharing has become increasingly important, globally and its centrality in realizing national goals cannot be overstated. African countries in particular facedby slow economic growth, would develop faster if research carried out with the aim of helping policymakers, understand the issues and produce better policies is effectively shared. Affirming this position, Hassan (2009) observed thatAfrica's sustainability problems can only be solved by science-based solutions and effective communicationmust play a key role in this.Digital institutional repositories centralto this study is a step towards mitigating ineffective sharing of research output.

The study therefore critically analyzed the status of digital institutional repositories (IRs) in Kenya by collecting and analyzing data onextent of repositories' implementation, content, technologies and perception of institutional repository administrators, on effectiveness of institutional repositories as a research sharing innovation.

Theoretical Framework

The theoretical basis for this study was derived from Diffusion of innovation Theory (DOI). The diffusion of innovation theory also known as multi – step theory as developed by Everett Rogers, has enormous value and application in media, communication and information studies. DOI has been applied in a wide variety of research sharing studies, related studies among them (Dorner & Revell, 2012; Kate Valentine Stanton, 2011 ; de beer, 2005 and Pinfield et al., 2014).

With respect to institutional repositories adoption Pinfield et al.(2014) provide a useful explanatory framework for understanding repository adoption at various levels: global, national, organizational and individual.

Major factors affecting both the initial development of repositories and their take up by users are identified, including IT infrastructure, language, cultural factors, policy initiatives, awareness-raising activity and usage mandates.

The diffusion of innovation theory postulates diffusion as the process by which an innovation is communicated through certain channels, over time among the members of a social system (Rogers, 1995). On the other hand Rogers saw innovation as "an idea perceived as new by the individual." Innovation could also be explained as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. As applied in this study, the theory holds open access repositories as an innovation to be adopted by all research institutions. In this research, diffusion is the process in which the open access repositories as a research dissemination technology is adopted by libraries in research organizations. DOI identifies five key attributes of an innovation that affect its rate of adoption: relative advantage, compatibility, complexity, trialability and observability. Each of these attributes have a bearing and likely impact on the rate of adoption of the digital repositories as a research dissemination solution.

Objective of the study

The study aimed at establishing the status current of institutional repositories in Kenya; an innovation aimed at enhancing sharingof Kenya's domestic research output worth billions of shillings that still remains inaccessible and unused, stacked in library shelves and office drawers in academic and research-based institutions.

Literature Review

A repository has been defined by Bonilla-Calero (2013) as the set of services offered in order to manage, disseminate and facilitate access to documents. On the other hand, Chapple (2013) describes a repository as a collection of resources that can be accessed to retrieve information. A digital repository is explained by where digital content and assets are stored and can be searched and retrieved for later use (Hayes, 2005). Most digital institutional repositories are open access based. An Open Acess (OA) repository can be defined as, "an online database … that makes the full text of items (or complete files) it contains freely and immediately available without any access restrictions" (Stephen Pinfield, 2004). Swan & Chan (2009) institutionalize open access repositories as digital collections of the outputs created within a university or research institution. Whilst the purposes of repositories may vary (for example, some universities have teaching/learning repositories for educational materials), in most cases they are established to provide Open Access to the institution's research output.

According to Armbruster and Romary (2010), digital repositories could be classified into the following four types; Institutional, Subject-based, research and national repositories.Institutional repositories contain the various outputs of the institution.

While research results are important among these outputs, so are works of qualification, teaching and learning materials. If the repository captures the whole output, it is both a library and a showcase. It is a library holding an institutional collection, and it is a showcase because the online open access display of the collection may serve to impress and connect, for example, with alumni of the institution or the colleagues of researchers.

A repository may also be an instrument of the institution by supporting, for example, internal and external assessment as well as strategic planning. Moreover, an institutional repository could have an important function in regional development. It allows firms, public bodies and civil society organizations to understand immediately what kind of expertise is available locally (Armbruster and Romary, 2010).

Digital repositories have provided research benefits to the public, individuals, groups or institutions. According to Swan (n.d.), the researchers, bring increased visibility, usage and impact for their work worldwide. Research Institutions enjoy the same benefits as researchers in aggregated form. Digital repositories provide a supermarket or one-stop-shop for research generated from the institutions and for countries, they provide for better utilization of research for policy making hence better return, and especially for public funded research. According to Mugambi et al., (2016), institutional repositories form as an avenue where researchers can post their grey literature and get views from other researchers in the same field thus enriching their output, hence refinement. It can also be used to knowledge sharing where lecturers can post knowledge materials and where the university scholars can intentionally search for knowledge.A research conducted by Electronic Information for Libraries *(*EIFL*)* in 2010showed an increasing rate of growth of repositories over the last several years with libraries playing a major role in advocating and maintaining repositories (Kuchma, 2010). The same report also revealed that electronic theses and dissertations are the most common type of material in the responding institutions' repositories. Other common material includes full-text of research articles as peer-reviewed postprints, journals published from the institution and conference papers.

The majority of participating institutions (56%) stated that less than 25% of the researchers or faculty members at their institutions have deposited material in the open access repositories.About two-thirds of the participating institutions use some form of mediated deposit in which staff members or librarians are directly involved in the deposit of materials into the repositories.

Kenya, like many sub-Saharan countries is still grappling with challenges in an attempt to establish and open up their repositories to the global world. Policy issues, staffing, infrastructure, promotion and sustainability are some of the challenges facing Kenya (Otando, 2011). Despite the challenges, adoption of open access has changed the landscape of research sharing in trailblazing organizations. Open access publishing in particular, has given power to the authors to become publishers ,opt for any type of new license models and anybody can start publishing journals which will encourage colleges, universities and other organizations to become publishers (Hahn, 2008).During the last one decade, libraries in Kenya have accelerated adoption of open access by establishing institutional repositories. This has enabled some academic and research libraries to provide a platform for publishing and disseminating research output.

A study by Otando in 2011 indicates that 65% of KLISC member libraries had embraced or were in the process of establishing Institutional repositories, while 35% had not (Otando, 2011).

Several interrelated factors have been found to influence development of digital institutional repositories.Lagzian, Abrizah, and Wee (2015) explored the critical factors that contribute to the success of institutional repositories implementation worldwide. The web-based survey of 322 institutional repository managers identified six factors being important for the success of institutional repository implementation. These six factors are “Management”, “Services”,

"Technology", "Self-archive Practices", "People" and "Resources". There is an extent of similarity between this study and the proposed study in methodology and respondents. The point of deviation is the type of repository and area of coverage. The proposed study deals with the national repository system in Kenya as opposed to global research on institutional repositories research by Lagzian, Abrizah and Wee (2015).

Methodology

The study used quantitative method of collecting and analyzing data. A sample of one hundred 111 IR administrators was purposively selected from librarians working in the 111 KLISC member libraries(KLISC, 2014).Purposive sampling (judgmental Sampling) is a type of non-propability samplingthat allows the researcher to use cases that have the required information with respect to the objectives of his or her study(Mugenda, 1999). This is recommended when the researcher selects a sample that suits the purpose of the study and that which is convenient (Gall & Gall Joyce P, 2007, p. 175).

Louangrath(2015)explains circumstances under which non- probability sampling can beacceptable method of obtaining data to include: lack of sampling frame; bias is negligible; data is time dependent and there is a significant difference between the base period and the current period as result of time lapse; data could be collected only where the collectors are available and when the sample size is small and limited. The choice of non probability sampling for this study was informed by lack of a sampling frame. Prior efforts to determine the number of persons working as librarians in KLISC member libraries yielded naught. Better still, purposive sampling can be used to collect both quantitative and qualitative data (Kombo, 2006).

In this regard, the researcher used his judgement to single out the librarians in charge of Institutional repositories from the unknown population of librarians in KLISC member libraries. IR librarians gave the desired information as opposed to other cadre of librarians. To obtain data, online questionnaires generated using *SoGoSurvey*were used. *SoGoSurveyis* a platform for building online forms and surveys for marketing, lead generation and research projects ("SoGoSurvey - Home," 2016).All librarians in charge of digital research repositories; be they ICT librarians, user services, technical, and managers or otherwise; purposively selected had an online questionnaire emailed to them.An introduction letter with the *SoGoSurvey*link and filling instructions was sent out.*The SoGoSurvey*tool also analyzed the results real-time as received from respondents. It also presented the analyzed data in tables, totals, percentages, charts and graphs.

Findings and Discussions

The Response Rate

The response rate is the number of participants from the sample who returned the survey expressed, in percentage terms (Wilson, Gray, & Hamilton, 2016). A summary response statistics from a sample of one hundred and eleven (111) IR administrators is provided in Table 1 below.

Sample Category	**Sample**	**Response/Interviewed**	**Percentage**
IR administrators	111	73	66%

Table1: Response Rate

The response rate for IR administrators was 66% (n=73).Whilst there is no universally accepted for a "good" response rate; a higher response rate minimizes bias and improves the prospects of generalizing the results from the sample to the defined population. According to Creswell (2012), "many survey studies in leading education journals report a response rate of 50% or more". This authority gives credence to this study's response to be within the acceptable range.

Results on the types of libraries that participated in the study

Figure 1 presents information on the various types of libraries that participated in the study. As stated earlier in the paper, KLISC had membership from different types of libraries among them public university libraries, Private university libraries, research libraries, government libraries among other types of libraries.

Q1. What best describes the type of your library:			
Responses	**Responses**	**%**	**Percentage of total respondents**
The Kenya National Library Service	1	1.37%	
Public University Library	19	26.03%	
Private University Library	37	50.68%	
Research Institution Library	4	5.48%	
Government Department Library	7	9.59%	
Non Governmental Organization Library	1	1.37%	
Other (Please specify)	4	5.48%	
(Did not answer)	0	0%	
Total Responses	**73**		20% 40% 60% 80% 100%

Figure 1: Type of Participating Libraries

Based on the information in Figure 1 above, majority of the respondents were from private university libraries 50.68 %, while respondents who participated in the study from public universities were 26.03%. Government Department Library respondents stood at 9.59% followed by research libraries at 5.48%. The Kenya National Library Service and Non Governmental Organization Libraries stood at 1.37% respectively. Other types of libraries accounted for 5.48%. According to the above study findings, it is evident that majority of the respondents were from private university libraries 50.68%.

Cumulatively, government libraries accounted for 36.99 % of the respondents. However, the list of the 111 KLISC member libraries (" Kenya Library & Information Services Consortium (KLISC)," 2015), shows that government institutions like public universities, government department libraries and the Kenya National Libraries Services (KNLS) and research libraries are the majority (55%) in KLISC. The means that the private education and research sector and Kenyan Government have equal stake in promotion of digital institutional repositories development.

Types of job positions of respondents

Q2. Which of the following library positions describes your primary position?			
Responses	**Responses**	**%**	**Percentage of total respondents**
Director/University/ Head Librarian	12	16.44%	
Digital Repository Librarian	8	10.96%	
ICT/Systems Librarian	9	12.33%	
Collection Development Librarian	3	4.11%	
Archives/Special Collections Librarian	5	6.85%	
Audiovisuals/Media Services Librarian	2	2.74%	
Cataloguing/Processing Services Librarian	10	13.70%	
Circulation/Reference Services Librarian	17	23.29%	
Other (Please specify)	6	8.22%	
(Did not answer)	1	1.37%	
Total Responses	**73**		20% 40% 60% 80% 100%

Figure 2: Types of job positions of respondents

Data depicted in Figure 2 indicate that there was a broad distribution of respondent librarians working in different library departments. Majority of the respondents were circulation/References Services librarians at 23.29%, followed by head librarians (16.44%), ICT/Systems Librarians (12.33%), Digital Repository Librarians and "other" librarians. The Archives/Special Collections, Collection Development and Media services librarians accounted for the smallest number of respondents.

It was expected that the number of digital repository librarians would have been the majority since the online questionnaires were mailed librarians in charge of digital repository administration.

The results also indicated digital repositories were managed by librarians in different library departments and not necessarily digital repository librarians. This view is collaborated by Cassella & Morando, (2012) who observed that high rate of repository administrators with other designations is a clear sign that repository management had not acquired a recognized professional status. This situation may have explained the slow development of institutional repositories in Kenya.

In addition, the higher number of head librarians managing digital repositories depicted a scenario of small libraries with very few staff and therefore the head librarians doubled up as digital repository librarians. Furthermore, the results indicated that a bigger percentage (12.33%) of digital repositories was managed by ICT/Systems Librarians. This was understandable because digital repository administration is closely related to ICT functions.

Only bigger libraries with sufficient staff and elaborate structure would afford to dedicate a librarian to digital repository administration.

Availability of Institutional Repositories

Q6. Are you aware that your organization has an institutional repository?			
Responses	**Responses**	**%**	**Percentage of total respondents**
Yes	58	79.45%	
No	14	19.18%	
(Did not answer)	1	1.37%	
Total Responses	**73**		

Figure 2: Results on availability of Institutional Repositories

Majority of respondents to the survey 79.45% reported that their libraries have institutional repositories with 19.18 %reporting that they were not aware. Only a meager 1.37 %did not respond to the question. This is shown in figure 2 above. This result lays a good ground for sharing research output data. The fact that most libraries have institutional repositories means, by extension, that they have some research content in digital form which they could share.The results also indicate that there are still a sizable number oflibraries that need to be brought into the loop.

Content Management software in use by libraries

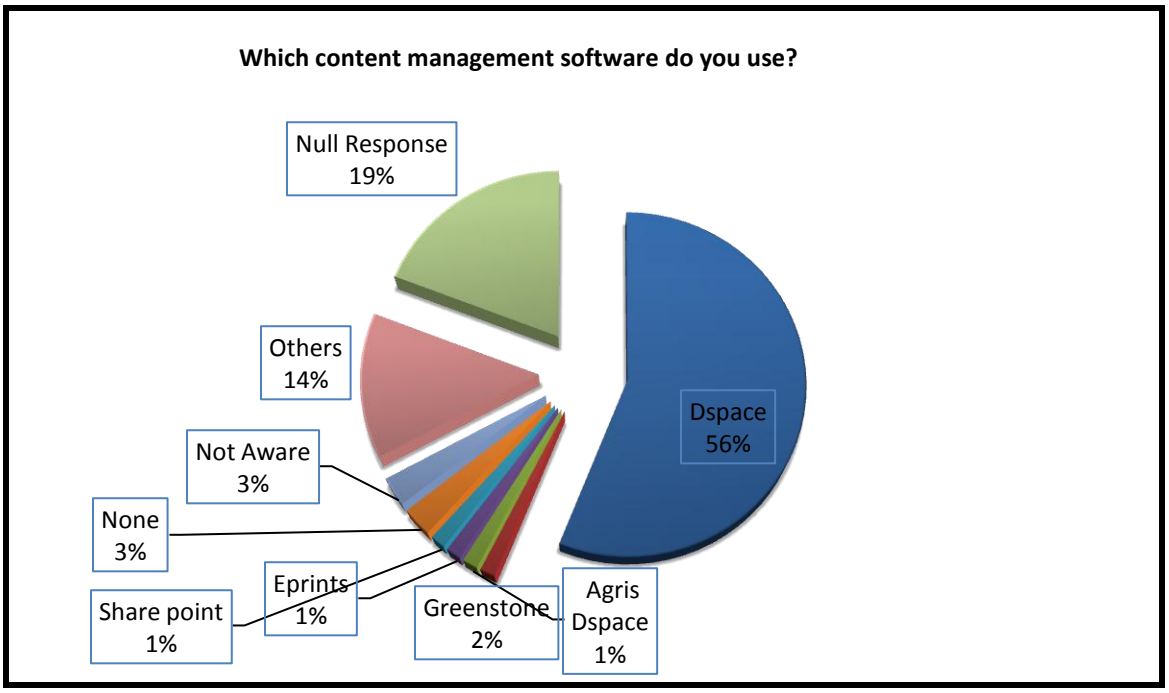


Figure 3:Content Management in use

Respondents whose libraries had institutional repositories were asked to state the different types of content management systems their libraries used. Results from this question are presented in Figure 3 above. It is evident that the Dspace management system was the most popular with 56% followed by Greenstone at 2%. Eprints, and Sharepoint accounted for 1% each. 3 % of the respondents indicated they were not using any IR content management software, while another 3% were not aware. Interesting 14% of the respondents indicated software such as Koha, Amlib, Winnebago and ABCD. However, these software were not treated as IR content management systems as they are majorly library management systems.

The main intent of this question was to establish whether the content management systems in use could share data content in a virtual setup. The findings are positive since most of libraries in Kenya used Dspace, the content management system of choice. Better still, the other Dspace, the other valid content management systems namely, Greenstone,Eprints and Sharepoint to a large extend support z39.50, Search/Retrieve via URL (SRU) and Search/Retrieve via Web (SRW).This means these content management systems could share research content data.

Metadata exchange protocols Supported by IR Software

Q8. Which of the following metadata exchange protocols does Institutional Repository Software named above support?		
Responses	**Responses**	**%**
The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH)	20	27.40%
Z39.50	31	42.47%
Search Retrieve via Web (SRW)	12	16.44%
Search Retrieve via URL (SRU)	9	12.33%
Other (Please specify)	8	10.96%
(Did not answer)	13	17.81%
Total Responses	**93**	
Multiple answers per participant possible. Percentages added may exceed 100 since a participant may select more than one answer for this question.		

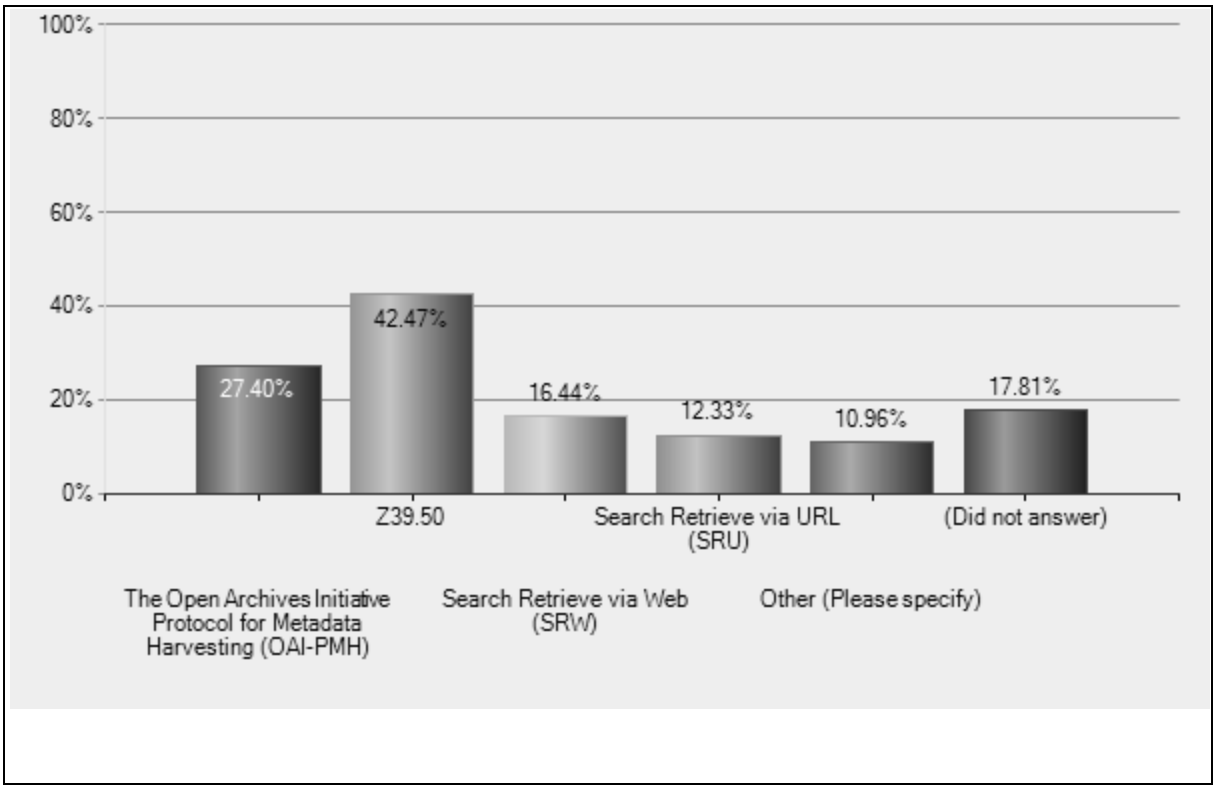


Figure 4: Metadata Exchange Protocols

A question was posed to ascertain whether the IR management systems used in their libraries supports key metadata exchange protocols. These protocols are the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH),Z39.50, Search Retrieve via Web (SRW) and Search Retrieve via Web (SRW).Figure 4show that 24.7 % affirmed that their IR content management system can supportOpen Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). 42.47 % supportedZ39.50, 16.44%) supported Search Retrieve via Web (SRW) and 12.33% (n=12) supported Search Retrieve via Web (SRW). 10.96% (n=8) supported other metadata exchange protocols such as SharePoint Document Sharing Web Service Protocolwhile 17.81(n=13) did not answer to the question. The findings affirms that majority of KLISC member libraries could share their IR contents using the data retrieval metadata exchange protocols.

Searchability of Institutional Repositories via World Wide Web

Q9. Is your Digital repository searchable through the World Wide Web?			
Responses	**Responses**	**%**	**Percentage of total respondents**
Yes	25	34.25%	
No	40	54.79%	
(Did not answer)	8	10.96%	
Total Responses	**73**		

Figure 5: Searchability of IR via World Wide Web

This question was intended to unveil the number of libraries whose institutional repositories are available online. The main reason is because the SRU and SRW protocols use web services in data exchange. In 25 libraries (34.25%), the IR contents can be searched via the World Wide Web (WWW) while 40 libraries (54.79%) are yet to avail their IR content on the web. This means that an SRU, SRW or a mash up of both standards could be used to access IR contentcomputerservers. Figure 5 shows the counts and percentages of search ability of IR via World Wide Web.

Number of records/objects held in Libraries' Institutional Repositories

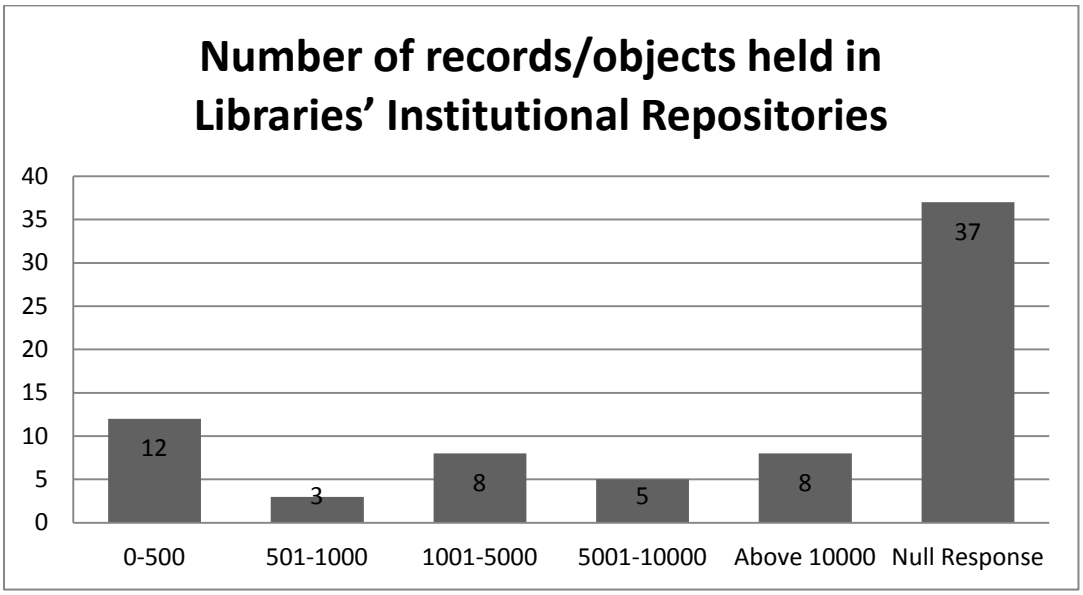


Figure 6: Number of records/objects held in Libraries' Institutional Repositories

Results as projected on Figure 6 above revealed that majority of the respondents 50.68% did not respond to the question. This may be explained by the rigour and skills may have been involved in generating reports from institutional repositories. Nonetheless, 16.44% indicated as having 0-500 records in their repositories, 4.1% had between 501-1000 records, 10.96%) reported their institutional repositories as having between 1001-5000 records, 6.85% had between 5001 – 10000 records while 10.96% had above 10,000 records. These results indicate that approximately half of the libraries have content to share .

Success rate of using digital repositories for research dissemination in libraries

Q19. How would you rate research dissemination success using digital repositories in your institution?			
Responses	**Responses**	**%**	**Percentage of total respondents**
0-10%	8	10.96%	
10-20%	4	5.48%	
20-30%	3	4.11%	
30-40%	6	8.22%	
40-50%	10	13.70%	
50-60%	5	6.85%	
60-70%	8	10.96%	
70-80%	8	10.96%	
80-90%	8	10.96%	
90-100%	4	5.48%	
(Did not answer)	9	12.33%	
Total Responses	**73**		20% 40% 60% 80% 100%

Figure 7: success rate of using digital repositories for research dissemination in libraries

This question aimed at finding the views of librarians as to the success of digital repositories as a research dissemination solution in their institutions. A rating of 40-50% had the most approval at 13.70% followed by the ratings of 60-70%, 70-80%, 80-90% and 0-10% all of which had 10.96approvals while 12.33% did not respond. A critical analysis of these results depicted in Table 7 above shows a mixed view of digital repositories as successful research dissemination solutions. 42.5% had less than 50% approval while 45.20% recorded over 50% approval.

These results showed that Kenyan libraries had not accrued the full benefit of digital repositories in research dissemination.

Conclusion and Recommendations

The findings revealed that the private education, research sector and Kenyan Government have equal stake in promotion of digital institutional repositories development. The findings also showed that digital repositories were managed by librarians in different library departments and not necessarily digital repository librarians. The high rate of repository managers with other designations is also clear sign that repository management had not acquired a fully recognized professional status in Kenya. In addition the results indicated that although majority of KLISC member libraries had established or were in the process of establishing institutionalrepositories, there were still a sizable number of libraries that were yet to develop institutional repositories.

Based on these findings and conclusions, the study offers the followingrecommendations to improve development digital institutional repositories:

1. Digital repository management should be recognized as full professional status. From the study findings it was evident that institutional repositories are managed by all cadres of library staff. Only a few of libraries had IR's managed by library personnel with full designations of IR administrators. The recognition should be backed by relevant training to impart skills relevant to IR administration and management.
2. Monitoring and evaluation of research output utilization should be strengthened within KLISC member libraries. It was evident from the study that respondents had difficulty providing research usage data which is critical in decision making.

3. The findings showed that 19.18% of KLISC member libraries had not developed institutional repositories.This is too big a percentage to be ignored. Effort should be made in the process of KNDRSS development to carry this large constituent of libraries that do not have institutional repositories.
4. Kenyan libraries had not accrued the full benefit of digital repositories in research dissemination. There is need for all stakeholders to showcase and publicize institutional repositories as effective research sharing innovation.

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