Assessing digital preservation strategies implemented for the institutional repository in Kaimosi Friends University Library

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Abstract

Rationale of Study – The purpose of the study was to determine the digital preservation strategies implemented for the institutional repository at Kaimosi Friends University College. The academic orientation of this study was anchored on the chain of preservation model.

Methodology – A descriptive research design was deployed. A census approach was used to enumerate the 46 respondents as the population of the study was small. An interview schedule and questionnaire were used as data collection instruments. A pilot study was conducted at Kibabii University library in order to bring to light any weaknesses in the questionnaire as well as in the survey techniques. The instrument was validated through examination by experts in the field of information science. The test-retest technique was utilised to assess the reliability of the instrument. The data collected in this study were both quantitative and qualitative, and they were analysed with the aid of SPSS and presented using tables and figures.

Findings – The prominent digital preservation strategies deployed in the institutional repository were backup (60.5%), technology preservation (60.5%) and information migration (51.2%).

Implications – The study recommends that Kaimosi Friends University College maintains the most commonly deployed strategies of digital preservation, namely information migration, backup and technology preservation.

Originality – This is an original study conducted in a public university in Kenya.

Keywords

Digital preservation, institutional repository, archiving, universities, Kenya

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1 Background to the study

Presently, a growing portion of academic research is being conducted digitally; therefore, institutions must develop methods for accumulating, managing, and preserving these digital assets to ensure future accessibility. Although there are new information technologies that scholars can embrace in their daily activities regarding intellectual output, these technologies have yet to be wholly integrated into Africa (Ezema, 2013).

The fact that information technologies are yet to be fully integrated in Africa means that the preservation of intellectual output for future access could pose visibility challenges to scholarly digital content held by universities. Nevertheless, institutions of higher learning are attempting to make their intellectual output digital and preserve it digitally for posterity for future access through institutional repositories (IRs) (Anyaoku et al., 2019).

Institutional repositories mirror an institution's intellectual output through digital materials in ensuring their global availability and long-term preservation for future access. Increasing output of scholarly content in universities puts pressure on libraries, precisely as far as effective digital preservation of IR materials is concerned in ensuring accessibility of the content not just at the moment but well into the future (Li & Banach, 2011). Digital preservation is considered a combination of all activities, practices, strategies and policies undertaken to ensure that digital content is perpetually maintained for as long as it is needed and beyond the limits of technological changes (Fabunmi et al., 2009).

An IR is established with the sole purpose of ensuring longevity and continuous access to digital scholarly materials. However, to ensure the longevity of IR content, libraries have to implement appropriate digital preservation techniques. In Latin American countries, Voutssas (2012) notes that the amount of digital material has geometrically increased without appropriate strategies to preserve it, and this is a concern regarding future access to these materials. In ten English-speaking African countries, the majority of institutions engaged in information migration as the favoured strategy for the preservation of digital content (Anyaoku et al., 2019).

The study was undertaken at Kaimosi Friends University, which is a public chartered institution of higher learning in the western region of Kenya that undertakes both teaching and research activities. Similar to other university libraries, Kaimosi Friends University Library owns a repository that supports its users in the acquisition, management, and

distribution of a range of products created by users' scholarly activities. The library in this institution is charged with the responsibility of ensuring the preservation of knowledge assets and digital information produced by the institution for future access. The whole essence of digital preservation of intellectual output and scholarly content in IRs is to ensure their future accessibility. This study is based on the preceding discussion in attempting to understand the linkage between the preservation of digital content and future access to IRs at Kaimosi Friends University Library. The choice of this locale was based on the fact that the institution is relatively new, and it is, therefore, still in the process of collating information for digital preservation to ensure future access to this information in digital format. In addition, the repository for this institution is not among those listed in OpenDOAR. The inclusion of repositories in OpenDOAR is through a rigorous review process that was yet to be fulfilled by the KAFU library.

2 Statement of the problem

Universities globally are increasingly generating plenty of scholarly and scientific information from research activities undertaken by students and faculty. Using IRs for the management of research output and, more so, repositories that are open access ensures that such papers get better citations than those which are subscription-based. However, given the sheer volume of scholarly content generated and uploaded in the repository coupled with the myriad administrative, operational and technical activities undertaken by universities, it is easy for libraries not to give attention to digital preservation, considering that it is not a daily service. The longevity preservation of digital content in the IR could, therefore, be jeopardised. This is because the research data is large and complex, and meaningful long-term preservation of such data for future accessibility would require adequate investments across the data lifecycle addressing issues of compliance, migration, metadata cat, blogging and data requirements.

Institutions through the library adequately facilitate the long-term preservation of scholarly content digitally through IR. Otherwise, the visibility and future accessibility of such materials may be limited, defeating the purpose of academic scholarly objectives and goals. Furthermore, the fact that IR serves as the primary digital archive for the institution means that if due attention is not given to these IR services, then the library may not fulfil the digital archival preservation function in terms of the volume of data and quality. This necessitated a study on the preservation of digital content to ensure future access to institutional repositories. Kaimosi University Library, being a young institution, attracts the

interest of whether they are maximising the full benefits of IR in terms of archiving, visibility and future accessibility. The study thus purposed to determine digital preservation strategies implemented for the institutional repositories in the Kaimosi Friends University College Library.

3 Literature review

The ever-changing technological environment has set libraries on a transformation trajectory. One such effect is a need for libraries to engage in preservation strategies that will ensure the availability and accessibility of the original digital information. Libraries must evolve with newer technologies in the preservation of digital content in IRs in order to be up to speed with standard best practices. This is meant to ensure that the library matches the current research trends and needs of users. Techniques for the digital preservation of information include refreshing or copying, encapsulation, information migration, technology emulation and technology preservation. The discussion hereunder discusses digital preservation strategies and reviews the literature on the techniques that have been utilised in libraries.

According to Russell (2000), the IR strategy focuses on the technological environment in which the object was initially created. In this strategy, hardware and software technological obsolescence is overcome by developing a replica or techniques that imitate the old system in the next-generation access tools. Technology emulation strategy is considered as offering a long-term preservation solution for digital resources whose future use is unlikely and whose value is unknown. The essence of emulation is maintaining the originality of the structure of the digital material in terms of its look, content and context.

Furthermore, Granger (2000) defines migration as the conversion or copying of digital materials from an old technology to a newer one while preserving the significant properties of the material. Digital information is transferred from one software and hardware configuration to another or another subsequent computer technology from the old computer technology. Migration serves to ensure that the integrity of the digital materials is preserved and that users can retrieve the same materials. In information migration, changes or developments in software and hardware do not affect the accessibility of digital information as migration is not concerned with the environment but only with the digital object itself. Libraries must regularly evaluate newer content management approaches and platforms with regard to digital preservation so as to keep up with the recommended

standards. This regular evaluation is based on the realisation that the technological environment is rapidly changing. Information migration is a good technique for overcoming technological obsolesce in hardware and software.

In another study, Lee et al. (2002) note that encapsulation plays a vital role in the other preservation techniques and is seen as an element in the emulation approach. However, in encapsulation, the purpose is to overcome technological obsolescence problems related to file formats. In this technique, an original application that was used to access the digital material is created on future computer platforms. Lee et al. (2002) further observe that copying as a digital preservation strategy involves having digital objects copied into newer access media before the old access media is rendered obsolete. When the digital objects are not copied to newer access media before the old one is rendered obsolete, then the information will no longer be accessible. An example of refreshing is having digital data stored in floppy disks copied to CD-ROM disks for continuity of access to the data, as the available hardware technology today does not support the old floppy disks. The integrity of the digital materials is preserved through this process.

Anyaoku et al. (2019) investigated digital preservation practices in the IRs of 24 African university libraries. The study was implemented in two phases, with the first phase being a website investigation to establish university libraries with fully developed IRs. In contrast, the second phase was an online questionnaire that was used to collect responses from IR librarians and managers. The study established that the most common strategy among the responding libraries was information migration (75%). Other responding librarians noted encapsulation (35%) and refreshing (30%). Similar findings were revealed by Baro and Kari (2016) in Nigeria, where they established from half of the responding librarians that they engaged in information migration in their IRs.

In Ghana, Adu and Ngulube (2016) examined digital preservation practices and strategies in Ghanaian public institutions. A survey approach was utilised, and the data was collected through a questionnaire method across the ministries and agencies. Essentially, the researchers investigated the present digital preservation strategies that are being implemented in these ministries and agencies. Migration is the widely implemented strategy for digital preservation across Ghanaian ministries and agencies. Emulation and refreshing were the least deployed digital preservation strategies. The popularity of information migration as a digital preservation strategy could be due to the ease of this strategy's

integration with the newest technologies. Little has been done in Kenya on the digital strategies used in IRs. This study sought to fill this gap.

4 Research methodology

A descriptive research design was used to execute this study. This research design fits appropriately for this study as it primarily described the current state of digital preservation vis-à-vis future access to digital content in IRs at KAFUCO. Both qualitative and quantitative approaches were applied, given that this was a descriptive study. A descriptive survey is the most effective method for characterising a population that is sufficiently large to be observed in person (Mugenda, 2011). The study was conducted at the KAFUCO library, which is responsible for the digital preservation of intellectual content generated within the university. The choice of this locale was based on the fact that the institution is relatively new, and it is, therefore, still in the process of collating information for digital preservation to ensure future access to this information in digital format. In addition, the repository for this institution is not among those listed in OpenDOAR. The inclusion of repositories in OpenDOAR is through a rigorous review process that perhaps was yet to be fulfilled by the KAFUCO library. Despite these assertions, it is worth noting that KAFUCO is an accredited institution that may be used as a case in this study. KAFUCO is located in Vihiga County in the western part of Kenya.

The population for this study comprised 45 professional library officers undertaking digital preservation functions in the IR as well as the chief librarian at the KAFUCO library. A census approach was used to enumerate the respondents as the population of the study was small. The study utilised a survey questionnaire and interview schedule as data collection tools. The suitability of these tools in this study was based on the fact that the type of data to be collected would be primary, and these tools are tailored in a manner that they can collect primary data.

A pilot survey was conducted at Kibabii University library in order to bring to light any weaknesses in the questionnaire as well as in the survey techniques. Improvements to the questionnaire were made based on the experience gained from the pilot survey. The improvement to the research instrument was basically in the wording of the questions to ensure that the questions were understood as intended and that they were not ambiguous. The validity of the instrument was examined by scholars who are experts in the field of information science. The test-retest technique was utilised to establish the consistency of the instrument. Interpretation of the resulting reliability coefficient was based on the

guidelines provided by George and Mallery (2003). A reliability coefficient of 0.784 was obtained from the items in the study during the pilot study.

The collected data was thoroughly cross-checked in order to discard any possible incomplete questionnaires whose analysis may affect findings by virtue of being complete. The data collected in this study were both quantitative and qualitative. The management and handling of quantitative data was done through a computer-assisted program, SPSS, which helped in the analysis of the same data using descriptive statistics. The presented quantitative data was analysed in the form of tables, pie charts, and bar graphs. Qualitative data was analysed using the thematic content analysis technique. In thematic content analysis, the researcher attempted to draw themes from the collected data and presented them through narrations. The data analysed in the presentation was followed by an interpretation and discussion of the findings while comparing them with the reviewed literature.

Informed consent was obtained from the subjects who assisted the researcher in investigating this study. Participation in this study was voluntary, and as a consequence of participation, the researcher offered a detailed explanation of the participants' benefits and rights beforehand. The researcher guaranteed respondents their confidentiality. In circumstances where the identity of the subjects was known to the researcher, this only remained with the researcher, and possible exposure of the respondents' identity was minimised.

5 Research findings and discussions

The objective of the study was to establish the digital preservation strategies implemented for IR at the KAFUCO library. This was necessary because, in the ever-changing technological environment, libraries have to engage in digital preservation strategies that will ensure the availability and accessibility of the original digital information in the future. Best standards and practices are the underlying factors bringing libraries up to speed with the evolving technologies in the preservation of digital content in IR.

5.1 Respondents' familiarity with digital preservation strategies

The study sought to find out digital preservation strategies that were familiar to them. The findings are presented in Table 1.

Table 1: Digital Preservation Strategies Familiar to the Respondents

Strategies	Responses		Percent of cases
	N	Per cent	
Technology preservation	29	21.3	67.4
Technology emulation	16	11.8	37.2

Information migration	24	17.6	55.8
Encapsulation	11	8.1	25.6
Copying/refreshing	23	16.9	53.5
Backup	33	24.3	76.7
Total	**136**	**100**	**316.3**

Table 1 shows that the respondents were aware of various digital preservation strategies that may be implemented to ensure future access to digital content. The most familiar digital preservation among the respondents was backup, accounting for 33 (24.3%), followed by technology preservation at 29 (21.3%). The other digital preservation strategies were information migration, accounting for 24 (17.6%), and copying/refreshing, which was cited by 23 (16.9%) of the respondents. The least known digital preservation strategy among the respondents was encapsulation, which accounted for 11 (8.1%). In the interview with the chief librarian, it was revealed that various digital preservation strategies may be adopted to ensure future access to digital content in the IR. The chief librarian, however, presumed that some of the staff may not be aware of the extent of the digital preservation strategies available.

This finding closely concurs with that of Adu and Ngulube (2016) in Ghana, who noted that familiar digital preservation strategies are almost similar to those in this study. This finding illustrates that the respondents are well aware of the strategies that could be deployed to ensure future access to digital content in the IRs. The respondents may be conversant with the strategies to ensure future access and availability of digital content that is geometrically increasing. Their familiarity with digital content preservation strategies implies that the intellectual output generated from KAFUCO is not rendered inaccessible due to technological changes.

5.2 Digital preservation strategies deployed in the library

The researcher sought to determine the digital preservation strategies deployed in the library to ensure continuous future access to digital content. This was necessary to determine whether the strategies would successfully guarantee future access to the digital content. The findings are presented in Table 2.

Table 2: Digital Preservation Strategies Implemented at KAFUCO Library

Strategies	**Responses**		**Percent of cases**
	N	**Per cent**	
Technology preservation	26	22.8	60.5
Technology emulation	18	15.8	41.9

Information migration	22	19.3	51.2
Encapsulation	9	7.9	20.9
Copying/refreshing	13	11.4	30.2
Backup	26	22.8	60.5
Total	**114**	**100**	**265.1**

Table 2 shows that according to the respondents, varying digital preservation strategies were deployed in the library to facilitate future availability and access to digital content generated in the institution. Backup and technology preservation strategies equally accounted for 26 (22.8%) of the responses as being strategies deployed in the library for digital preservation. The information migration strategy followed this was cited by 22 (19.3%) of the respondents, whereas 18 (15.8%) cited the technology emulation strategy. The least cited strategy deployed in the library for digital preservation was encapsulation, which accounted for 9 (7.9%) of the stated strategies. The chief librarian noted that backup and information migration were the most prominent digital preservation strategies deployed in the library. However, depending on the digital content to be preserved, an appropriate strategy would be implemented to ensure future access to it.

This finding is in agreement with the findings of other previous researchers, including Baro and Kari (2016) and Anyaoku et al. (2019), particularly on information migration as the prominent strategy in digital preservation of digital content in the IR. Information migration entails the conversion or copying of digital materials from an old technology to a newer technology while preserving the significant properties of the material. This finding means that future availability and access to digital content will not only be guaranteed but also that the integrity of these digital materials will be preserved. Furthermore, the choices of these digital preservation strategies implemented mean that technological changes with regard to software and hardware may not affect the future accessibility of digital information because these strategies are not concerned with the environment but only with the digital object itself.

6 Conclusion

On the digital preservation strategy deployed for the IR, it is concluded that KAFUCO may guarantee future availability and accessibility to digital content generated in the institution through backup, technology preservation and information migration strategies. These are digital preservation strategies that are widely deployed in IRs.

7 Recommendations

The study recommends that KAFUCO maintain the most commonly deployed digital preservation strategies, namely information migration, backup, and technology preservation. These strategies are widely deployed globally in the IR to guarantee future availability and accessibility to digital content.

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