

Non-Print Information Resources and The Preservation Approaches Recommendation in Tanzanian Academic Libraries



Sumber Informasi Non-Cetak dan Rekomendasi Pendekatan Pelestarian di Perpustakaan Akademik Tanzania

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Abstract

Background: Non-print information resources are increasingly becoming more important as vital learning materials in higher learning institutions. Academic libraries therefore, have to acquire, process, organize and preserve them for current and future use. **Purpose:** This paper aims to assess the factors affecting the non-print information resources and their recommended preservation approaches in academic libraries. **Method:** The study adopted a convergent parallel mixed approach which collects and analyses data to produce integrated findings by using both qualitative and quantitative techniques in a single study. Data was collected by means of questionnaire and in-depth interview. **Result:** The study revealed that dust, loss of data on disc and hard disc, loss of data due to server failure, high heat, and excessive light, fading of disc surface, high humidity, fungus on disc surface, atmospheric pollutants and virus attack were factors affecting non-print information resources. It was also revealed that highly recommended preservation approaches were good cleanliness of library where information resources are kept, educating library users on how to handle and use information resources, migrating information resources from obsolete storage media to modern storage media, technology preservation and refreshing. **Conclusion:** The study concludes that library staff need to adopt recommended preservation approaches to safeguard the important information in academic libraries but also system librarians in academic libraries need to be employed to assist in trouble shooting issues.

Keywords: Non-Print Information Resources; Information Resources; Information Resources Preservation; Preservation Approaches; Academic Library

Abstrak

Latar Belakang: Sumber informasi non-cetak sekarang ini menjadi semakin penting sebagai bahan pembelajaran vital di perguruan tinggi. Oleh karena itu, perpustakaan akademik harus memperoleh, memproses, mengatur, dan melestarikannya untuk penggunaan saat ini dan masa depan. **Tujuan:** Makalah ini bertujuan untuk menilai faktor-faktor yang mempengaruhi sumber informasi non-cetak dan pendekatan pelestarian yang direkomendasikan di perpustakaan akademik. **Metode:** Studi ini mengadopsi pendekatan campuran paralel konvergen yang mengumpulkan dan menganalisis data untuk menghasilkan temuan yang terintegrasi dengan menggunakan teknik kualitatif dan kuantitatif dalam satu studi. Pengumpulan data dilakukan dengan kuesioner dan wawancara mendalam. **Temuan:** Hasil penelitian menunjukkan bahwa debu, hilangnya data pada disk/hard disk, hilangnya data karena kegagalan server, panas yang tinggi, dan cahaya yang berlebihan, memudarnya permukaan disk, kelembaban tinggi, jamur pada permukaan disk, polutan atmosfer dan serangan virus adalah faktor yang mempengaruhi sumber informasi non-cetak. Diungkapkan juga bahwa pendekatan pelestarian yang sangat direkomendasikan adalah kebersihan perpustakaan tempat sumber informasi disimpan, mendidik pengguna perpustakaan tentang cara menangani dan menggunakan sumber informasi, migrasi sumber informasi dari media penyimpanan usang ke media penyimpanan modern, pelestarian teknologi dan penyegaran koleksi. **Kesimpulan:** Studi ini menyimpulkan bahwa staf perpustakaan perlu mengadopsi pendekatan pelestarian yang direkomendasikan untuk melindungi informasi penting di perpustakaan akademik, tetapi juga pustakawan di perpustakaan akademik perlu dioptimalkan untuk membantu memecahkan masalah yang ada.

Kata kunci: Sumber Informasi Non-Cetak; Sumber Daya Informasi; Pelestarian Sumber Daya Informasi; Pendekatan Pelestarian; Perpustakaan Akademik

I. INTRODUCTION

Background. Academic libraries are always regarded as the heart of any higher learning institution. They preserve information resources to serve the community of higher learning. Ntulo established that academic libraries possess various information resources such as books, periodicals, maps, CD ROMs, theses, dissertations and databases that need to be protected for the current and future generation (Ntulo, 2017). Information resources play an important role in academic libraries since without them there would be no information services in those libraries. The word information resources consist of two words i.e. information and resources. In this context a resource is a place or individual from which you can acquire something helpful or important while information refers to facts communicated or taught (Lee, 2019). Thus, resources where information can be acquired refer to information resources.

The two main types of information resources available in almost every type of library today are: printed information resources and digital or non-printed information resources. Printed information resources are those tangible information carriers that are used for sharing or transmitting or disseminating information from one individual to another. Schement stresses that since the development of paper making technologies; printed papers have been the major means of information sharing and dissemination from one place to another and from one generation to another (Schement, 2002). Printed information resources can be in the form of books, newspapers, encyclopedias, dictionaries, almanacs, journals and magazines through which information is shared among library stakeholders like researchers, lecturers and students. Formally, academic libraries relied on printed information resources to provide information services to clients. Development in technologies have enabled libraries to possess millions of digital information resources available for various purposes like teaching, research and consultancy.

Non-print information resources include all digital surrogates created as a result of converting analogue materials to digital form and for which there has never been and is never intended to be an analogue equivalent. Non-print information resources are increasingly becoming important learning resources in the modern libraries due to easy accessibility and sharing mechanisms. Oluwaseun et al. recommended that due to the significant value of the digital information resources like Compact Discs (CDs), Digital Video Discs (DVDs), sound recordings and other electronic records to academic libraries, there is a need to give them higher preservation priority in order for them to have a longer lifespan (Oluwaseun et al., 2017). Non-print information resources that exist in academic libraries comprises digital materials collected, processed and stored by libraries which includes books, periodicals, pamphlets, reports, microforms, maps, manuscripts, motion pictures and all other forms of visual and audiovisual records. Non-print information resources vary from the print information resources in some ways.

According to Stewart, print resources are localized, unless multiple copies are available in the library (Stewart, 2000). Furthermore, print resources can be read by one library user at a time while digital information resources can be available to many libraries at a time and being accessed and retrieved by many library users at a time. However, one of the main differences is that with digital information resources a

machine must serve as a mediator between the information and the user. Despite the many benefits of non-print information resources still they are not free from the factors that affect their accessibility and usability in libraries and other information centres. This study therefore, investigates the factors affecting non-print information resources and their recommended preservation approaches in academic libraries

Problems. In Tanzanian academic libraries non-print information resources are greatly utilized by students and lecturers in academics and research works. These includes all the information found in CDs, DVDs, Tapes, Blogs, YouTube channels and academic social media platforms on which their information are stored on cloud storage services (Emwanta & Nwalo, 2013; Rutto & Yudah, 2018). Despite its contribution to the academic and research accomplishments still these resources are suffering from various factors that affect the lifespan and their recommended preservation approaches are not adequately reported and shared among library staff who are principally the custodians and preservation administrators of the information resources in academic libraries.

Previous Literature Review. The research by Ajiboye & Arowolo about format preference and utilisation of Library information resources in a Nigerian State, the study concluded by recommending that university libraries should invest more in the acquisition of current and updated textbooks and e-books that were found to be the preferred formats of library information resources by the respondents (Ajiboye & Arowolo, 2021). Research by Mubofu et al. find that factors for considerations in preserving information resources like policy, fund, skilled labour, infrastructure and management support were explained so that they could be simply understood (Mubofu et al., 2020). The study by Iyanda & Opele concluded that for academic library to function effectively, they should collaborate with relevant institutions and adopt the best strategies that will enhance the management of print and non-print information resources for sustainable national educational development in the country (Iyanda & Opele, 2015). The research finding by Mane & Panage that Information Resources must be organized with Library portal, because it is key to knowledge, it is an effective tool for web-enabled information services to supports the users' needs (Mane & Panage, 2015).

State of The Art. Non-print information resources have been neglected despite their contribution in academics, research and consultancy issues. This study contributes to the existing body of knowledge on the preservation of non-print information resources for sustainable information services provision in libraries. The study is also important in fulfilling the information needs of library clients like students, lecturers and researchers. Adopting the John Ruskin preservation theory and conservation theory by William Morris approaches for preserving and conserving the non-print information resources have been perfectly discussed in this paper. Thus, the factors affecting their lifespan are inadequately reported in the scholarly platforms and the recommended preservation approaches are not widely known among library staff in academic libraries.

Purpose. The purpose of this study is to assess the factors affecting non-print information resources and the recommended preservation approaches in academic libraries in Tanzania.

II. METHODS

This study was done in seven academic libraries operating under public universities namely, Open University of Tanzania, Sokoine University of Agriculture, Mzumbe University, Moshi cooperative University, Muhimbili University of Health and Allied Sciences, Ardhi University and University of Dar es Salaam. Selection of libraries from the mentioned universities based on the fact that they were well established with a large collection of information resources available in print and non-print formats and thus library staff working in those libraries were envisaged to have great experience in preservation of non-print information resources. A convergent parallel mixed approach which collects and analyses data to produce integrated findings by using both qualitative

and quantitative techniques in a single study to serve for mutual validation of data and findings as well as for the production of a more coherent and complete picture of the investigated domain than mono-method research could yield was used in this study (Kelle, 2006; Mbwete, 2015). The study further employed descriptive and explanatory research designs in addressing the research questions. 170 Library staff and 7 library directors from the seven public university libraries under study served as the unit of analysis for this study. Thus, a total of 177 research informants participated in this study. Non-probability convenience sampling was used to select library staff working in the selected academic libraries to participate in this study. All library staff who were easily accessible and willing to cooperate were selected to participate in the study. The study adopted convenience sampling because of its outstanding advantage that it does not require finite lists of possible respondents, as it is with the case of probability sampling techniques like random sampling (Farrokhi 2012; Saunders et al., 2012). The study also used purposive sampling techniques to gather rich information cases from library directors. Newman noted that purposive sampling technique is often used when a researcher wishes to select cases that are particularly informative (Newman, 2000). Data were collected using administered questionnaires and key informant interviews.

For qualitative data analysis, content analysis was used to analyse qualitative data from key informant interviews. Data was recorded and transcribed prior to data analysis. Thereafter data were coded to assist the identification of themes and sub-themes related to the topic under investigation. Based on the study objectives, data were compared and contrasted based on each piece of data with the rest in order to see whether there are similarities and differences on factors affecting the non-print information resources and the recommended approaches for preserving the same from the seven public university libraries under study. For quantitative data analysis, data collected from the administered questionnaire were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 computer program for proper data storage and management. Three stages of descriptive analysis were adopted. Data collected, cleaned and finally entered into the SPSS for analysis. From the analysis frequency and percentages were generated reported in tables and figures for easy understanding.

III. RESULTS AND DISCUSSION

Distribution of Respondents by Occupation. This study included 177 respondents out of which 170 (96.05%) were library staff while 7 (3.95%) were library directors from the selected academic libraries under study.

Table 1.
Distribution of Respondents by Occupation

Num	Category of Respondent	Frequency	Percentage
1.	Library staff	170	96,05%
2.	Library director	7	3,95%

Source: Research Data Processing in 2021.

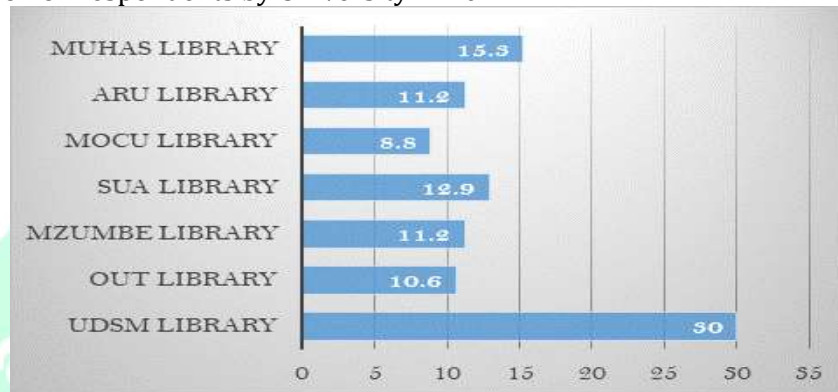
It is vivid from table 1 that the majority 96.05% of the participants were library staff from the seven academic libraries under study. It was important to include a large number of library staff in this study due to the fact that among other things library staff are responsible with the daily information services provision and they are aware of the status of non-print information resources in their libraries. Library staff works to ensure smooth information flow from the libraries to the clients by ensuring that computers and

networks are working properly. On the other hand library directors were included simply because they are responsible for effectively directing, planning, organizing, staffing, coordinating, budgeting, and evaluating the day to day library's operation.

Distribution of Respondents by University. The study involved 18 (10.6%) library staff from OUT library, 51 (30%) from UDSM library, 19 (11.2%) from Mzumbe library, 22 (12.9%) from SUA, 15 (8.8%) from MoCU library, 19 (11.2%) from ARU library and 26 (15.3%) from MUHAS library as summarized in figure 1.

Figure 1.

Distribution of Respondents by University in 2021.



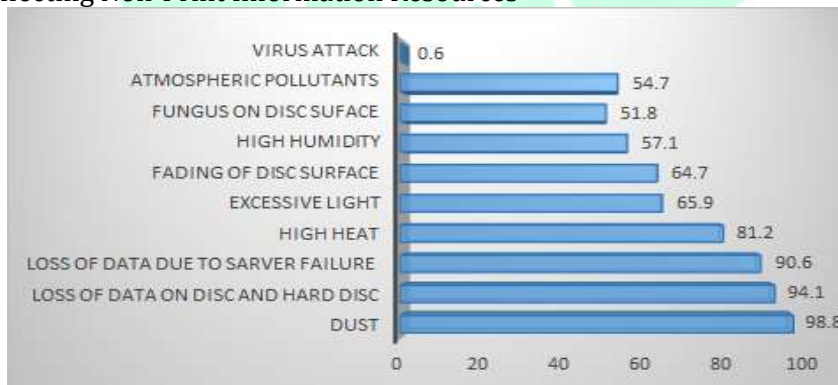
Source: Research Data Processing in 2021.

The findings in figure 1 shows that the majority (30%) of the library staff participated in this study were from the University of Dar es Salaam (UDSM) library. This is probably because the University of Dar es Salaam has the largest academic library in the county compared to other universities. Since it has a large number of library staff it was easy to get the right number of participants to participate in this study. On the other hand Moshi Cooperative University (MoCU) had only 8.8% participants because it is the smallest library included in this study. This is probably because it has just recently raised from being an affiliated college of Sokoine University of Agriculture. So it may be concluded that it is still in the transitional period and therefore even the number of library staff is still minimal.

Factors Affecting Non-Print Information Resources. The factors affecting non-print information resources that got high score are further discussed in details in the following in Figure 2.

Figure 2.

Factors Affecting Non-Print Information Resources



Source: Research Data Processing in 2021.

a. Dust. The findings in this study indicate that the majority 98.8% of the respondents indicated that dust is the kind of deterioration mainly affecting the non-print information resources. The sources of the dust have been studied and a conclusion reached that it comes from both organic and inorganic materials (Achara and Yusuf, 2020). Accumulation of dust on digital information resources has been investigated to conclude that its presence creates a significant adverse impact on the performance of such information resources (Achara and Yusuf, 2020). Dust aggregation on the surface of non-print materials containing information like disc, hard disk, USB flash and other miniature mobile devices such as XD-Picture cards contributes greatly to their damage. For example, one library director said;

"...dust affects the non-print information resources like CDs, Tapes, computers and DVDs to the extent that most of them are no longer readable and the information contained on them are no longer accessible. This has been attributed to lack of proper facilities for preserving the available materials that contain information in digital form".

The study findings imply that library staff must ensure that the accumulation of dust on their libraries is discouraged for the longer survival of the available non-print information resources. Constant housekeeping should be maintained in libraries as a way of protecting digital resources from dust accumulation.

b. Loss of data on disk and hard disk. About 94.1% of the respondents noted that loss of data on disc and hard disc was the kind of deterioration greatly affecting the non-print information resources in the selected academic libraries. According to Lin et al. disc and hard disc are traditional huge digital data storage ways which do not cover the demand of data growth (Lin et al., 2020). Continuous use of these devices could lead to loss of important information. In this era of digital information explosion it is important for the libraries to preserve their digital information resources in the holographic data storage technologies. Holographic data storage technology is one of the most promising next-generation data storage technologies due to its high storage density, fast data transfer rate, long data lifetime and less energy consumption (Lin, et al., 2020). In the interview one of the library staff echoed that;

"... loss of data on disc and hard disk has been a great problem due to the fact that we lack experts who could inspect the computers in our libraries and inform the management on the expected lifespan of those computers. So it has been a challenge that computers fails to operate and goes with our important information/data on discs"

c. Data loss due to server failure. Further findings from this study show that 90.6% of the respondents revealed that data loss due to server failure is another kind of digital information resource deterioration in academic libraries in Tanzania. Servers are unified repositories for digital information resources and are configured as banks of magnetic hard disk drives to facilitate large scale operations (Gole et al., 2020). If the server is corrupted even the metadata that identifies the non-print information resources stored in those servers are lost and the information resources stored in the server cannot be accessed and retrieved without metadata. Thus, library information resources stored on servers should be protected for their accessibility and retrievability to be sustainable for the current and future generation. In order to reduce data loss because of server's failure Adu suggested backup, refreshing, metadata and auditing of digital records. From the interview with library directors, one director explained that;

"... Server failure in most cases is caused by infrequent hardware and software maintenance. When the server fails all the services that depend on it such as the library management information system and access to institutional repositories goes down."

The findings therefore imply that libraries need to employ system librarians who could specifically fix all computer problems including that of server failure in order to rescue this great challenge of losing vital data due to server failure.

d. High heat. High heat was also revealed to be the kind of deterioration affecting non print information resources academic libraries. In this study 81.2% of the respondents noted that high heat accelerates the speed of damage of digital information resources. High heat or simply overheating of non-print information resources containers can lead to physical deterioration of the controller board's firm chip which consequently stops the drive from functioning properly (Lin et al, 2020). In libraries where computers containing vital non-print information resources are kept need to be free from dust because accumulation of dust could block the airflow and coat the inner parts of those computers leading to high heat which finally could prevent the accessibility of digital information found in those computers. One among the interviewed library directors explained that;

"... high heat in digital information resources storage media like hard disc are caused by excessive accumulation of dust on the computer systems which prevents the fan from working properly and allow free flow of air in the computer system. For instance, hard disc are among the sensitive components of a computer system that store large amount of non-print information resources but it may easily get damaged by overheating of the system and prevent the computer from recognizing the drive and the computer may shutdown without prior notice"

e. Excessive light. The results in Figure 2 show that 65.9% of the respondents established that excessive light is the kind of deterioration mainly affecting information resources in Tanzania. Observed that incidents of theft and excessive light and other forms of degradation of library stock are on the increase depending on the nature of the information resources (Saka et al., 2020). For instance, optical discs will perform well within a wide range of temperature and relative humidity conditions while discs kept in a cooler, less-humid environment and not subjected to extreme environmental changes last longer. Other factors of deterioration of digital information resources that scored low include fading of disc surface, high humidity, atmospheric pollutants, and fungus on disc surface as well as virus attack.

Recommended Information Resources Preservation Approaches. Respondents were asked to recommend the best information resources preservation approaches suitable for adoption in their respective academic libraries. This was intended to know the best approaches for preservation of information resources that library staff could recommend for their libraries to adopt. It was expected that library staff are likely to recommend the approach that they are knowledgeable on and could apply them to safeguard the library information resources. The findings are provided in Table 2.

Table 2.

Recommended Information Resources Preservation Approaches

Num	Recommended Resources Preservation Approaches	Responses (%)		
		Not Recommended	Moderately Recommended	Highly Recommended
1.	Good cleanliness of library where information resources are kept	0.6	21.2	78.2
2.	Educating library users on how to handle and use information resources	-	39.4	60.6
3.	Encapsulation	9.4	56.5	34.1
4.	Provision of adequate security to prevent theft of library information resources	0.6	75.3	24.1
5.	Installation of air conditioners in library for temperature regulation	-	50	50
6.	Migrating information resources	1.2	24.7	74.1

	from obsolete storage media to modern storage			
7.	Technology preservation	-	28.8	71.8
8.	Microfilming	56.5	16.5	27
9.	Refreshing	0.6	18.2	81.2

Source: Research Data Processing in 2021.

The most cited as highly recommended information resources preservation approaches were good cleanliness of library where information resources are kept, educating library users on how to handle and use information resources, migrating information resources from obsolete storage media to modern storage media, technology preservation and refreshing. The least cited recommended information resources preservation approaches were encapsulation, provision of adequate security to prevent theft of library information resources, installation of air conditioners in libraries for temperature regulation and microfilming. These recommended approaches are further discussed in the following subsections:

a. Good cleanliness of the library where information resources are kept. Good cleanliness of libraries where information resources are kept was highly recommended by 78.2% of the respondents interviewed in this study. The study by Khan and Ameen also reported that cleanliness of libraries is not only a good approach in protecting library information resources from attack by dust but also is a good way of attracting library patrons to make use of the information resources for addressing their information needs (Khan and Ameen, 2020). This implies that cleanliness of libraries is an excellent preservation approach that should be adopted in all academic libraries since it seems to be understood and practiced by most of the information centers. During the interview one library director narrated that:

"... most of the non-print information resources are highly affected by dust and the only way to keep them safe is by ensuring that the library is always clean and the computer laboratories which are used by library patrons are properly cleaned to avoid accumulation of dust which is dangerous to computer hard discs and other resources."

b. Educating library users on how to handle and use information resources. Now libraries need to improve the digital literacy of librarians and users (Pambayun, 2021). It was further observed that 60.6% of the respondents highly recommended educating library users on how to handle and use information resources. The preservation approach of educating library users on how to handle and use information resources was reported to be conducted always during the orientation period at the beginning of every semester. This has been noted to reduce the risk of damage that could be caused by students due to poor handling. Library staff normally use a variety of techniques like one by one guidance on proper retrieval of CDs from storage containers and socialization with clients especially students through social media like WhatsApp and Instagram by sharing clips that shows how non-print information resources should be handled. The study by Vivek, et al., (2020) on "Development of a system to assist in library to automate the book handling process" noted that during book handling process in the library, the books may get damaged, due to poor handling, or over stacking which may lead to torn pages, separated pages, sections and many more. Thus, due to great damage caused by poor handling practices Vivek, et al (2020) suggest the application of a book handling robot that could return the books on shelves without any human involvement. Library directors during the interview noted that;

"... one of the key functions of a library director is to educate the library users on how to handle and use information resources properly without causing damage to them. This applies to both print and non-print information resources. For instance, with regard to

digital/non-print information resources it is recommended to handle and use them very carefully since they are delicate and they can easily get damaged. CD's and DVD's are handled through the centre hole, kept in dust free areas and returned into their cases immediately after use"

c. Encapsulation. Furthermore 56.5% of the respondents moderately recommended encapsulation preservation approach. Encapsulation preservation approach is a hybrid which can be applied in preserving digital as well as print information resources. In the context of digital resource encapsulation means to bring together a digital information resource or anything necessary to ensure access to the resource in question; by this strategy, the information required to preserve a document is classified (Samiei, 2020). On the other hand print information resources are encapsulated in a virtual envelope to allow information accessibility and readability for a longer time. One library director explained that;

"... encapsulation is a vital preservation technique applied in most libraries and it requires metadata to be bundled with the digital information resources to allow it from being intellectually understood and technologically accessed in the future. Although the technique is not highly applied in Tanzanian context efforts are underway to use experts from the Consortium of Tanzania University and Research Libraries (COTUL) to train library staff in the country on how to apply it in digital preservation of information resources"

d. Provision of adequate security to prevent theft of library information resources.

The study also revealed that 75.3% of the interviewed respondents moderately recommended the provision of adequate security to prevent theft of library information resources. The findings implies that there has been a problem of theft of library materials in academic libraries and the library staff suggested tightening of the security systems in the study areas in libraries. Adenike and Raliat, (2020) noted that students use handbags and confuse/divert the attention of library staff at the circulation desk when they want to steal information resources in a library (Adenike and Raliat, 2020). Monitoring the attitudes of people in the library, mounting cameras, having well qualified library staff and good orientation programs are the major methods for preventing library information resources from theft and mutilation. Although the library is a shared resource it cannot be left free without locks for anyone to walk in at any time and help themselves to whatever they want. Library directors noted that;

"... it has been a big challenge to safeguard the digital resources from being stolen due to their portability nature. Students have been stealing the CDs and DVDs containing important information for research and other academic works. Due to that we have installed the camera in order to easily detect the one who will be stealing these resources"

e. Installation of air conditioners in the library for temperature regulation.

Regarding the Installation of air conditioners in the library for temperature regulations, 50% of the interviewed respondents highly recommended it while the same percent of respondents moderately recommended it. The findings imply that installation of air conditioners in library facilities are likely to help the preservation process since air conditioners reduce the amount of temperature available in the library which is dangerous for the survival of library information resources. Library directors during the interview echoed that;

"Installation of air conditioners is important in regulating the amount of heat available in the computer rooms where non-print information resources are stored and utilized by the clients. We know that computer components can easily shut down when overheated while the motherboard temperature sensor when it gets hot can command hardware to slow down. So installation of air conditioners in libraries could help to prolong the lifespan of non-print information resources found in computers"

f. Migrating information resources from obsolete storage media to modern storage media. It was also revealed that 74.1% of the respondents highly recommended

migrating information resources from obsolete storage media to modern storage media. Migration is one of the means for digital preservation and to make the information sustainable throughout time (Chung, 2020) it is normally conducted to address the problem of system errors that might compromise the digital information accessibility. This is the preservation approach that ensures the long term accessibility of digital information resources in various libraries. Even though migration was a highly recommended approach for long term preservation of digital library information resources, observations show that none of the academic libraries under study are currently executing it. Library directors during the interview noted that;

"Migrating information resources from one obsolete storage media to modern storage media is something inevitable. We used to store information in diskettes but today's library staff do not use it and they know nothing about it. The information we stored in the diskettes if they were not migrated in the modern storage media could have been difficult to access and retrieve them. So we have been practicing migration to ensure sustainable accessibility of non-print information for current and future use"

g. Technology preservation. Technology preservation was highly recommend by 71.8% of the respondents interviewed in this study. According to Umana technology preservation refers to the method for ensuring ongoing access to digital information resources by keeping the old technology used to create and access digital information in their original form and environment in the event of technological change (Umana, 2020). Although this method seems to be highly recommended by library staff in the study area, it is expensive as it requires adequate space for storage of older machines. In simple technology preservation is the technology of preservation approach which refers to a means of overcoming technological obsolescence by preserving software and hardware applied to access a digital resource (Samiei, 2020). It was further noted by library directors that:

"Preserving technology used to access the software when it was originally created is the best approach because the hardware and software normally have a lifespan of 10 to 20 year. So preserving the technology will ensure sustainable information accessibility"

h. Microfilming. More than 50% of the respondents not recommended the microfilming preservation approach in academic libraries. The findings of this study negates the previous findings by Saka et al (2020) who revealed that microfilming was the major method recommended and adopted to preserve serials in Federal University Libraries in Northern Nigeria. The findings of this study indicates that microfilm is no longer a user friendly medium for information access and the library staff confirmed this by not highly recommending it for adoption in academic libraries. With regard to microfilming library directors explained that:

"This technology is out of date and it is no longer used by our libraries and even in record centres"

i. Refreshing. The study findings in Table 2 further revealed that 81.2% of the respondents highly recommended the refreshing preservation approach to be adopted and used by all academic libraries in Tanzania. Although this approach was highly recommended by the majority of the study respondents it is not quite sure whether the library staff have the necessary skills required to preserve information resources by refreshing approach. Based on the results of previous study Mubofu, et al., (2020) it has been reported that technical digital preservation skills are vital to library staff who are responsible in managing non-print information resources, these requirements however seem to be lacking among library staff whose work scope is limited to dealing with preservation of digital content. The study findings therefore imply that staff training is important in keeping library preservation administrators aware of what is new in their field of specialization especially on new techniques for the conservation and preservation of information resources.

It was further revealed in the interview that most of the library directors' agreed that for a smoother workflow and better productivity, refreshing a computer system used to store and access non-print information resources after 4 or 5 years is very important.

IV. CONCLUSION

From the findings it can be conclude that the major factors affecting the life span of digital or non-print information resources in academic libraries include dust, loss of data on disc and hard disc, loss of data due to server failure, high heat, and excessive light, fading of disc surface, high humidity, and fungus on disc surface, atmospheric pollutants and virus attack. Therefore, adopting modern digital preservation methods is critical for the long-term survival and continued accessibility of non-print information resources in academic libraries. The study further concludes that the best recommended preservation approaches of non-print information resources include good cleanliness of library where information resources are kept, educating library users on how to handle and use information resources, migrating information resources from obsolete storage media to modern storage media, technology preservation and refreshing.

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VI. REFERENCES

- Achara, N., & Yusuf, D. (2020). Photovoltaic system performance in the Presence of Contaminants. *International Journal of Innovative Research and Advanced Studies (IJIRAS)* 7 (7) 161-164. Retrieved from https://www.wjir.org/download_data/WJIR0806020.pdf
- Adenike, O., & Raliat, A. (2020). Theft, Mutilation and Abuse of Library and Information Materials by Undergraduate of University of Ibadan, Nigeria. *Information Impact: Journal of Information and Knowledge Management*, 11(2), 1-12. <https://dx.doi.org/10.4314/ijikm.v11i2.1>
- Adu, K. K. (2015). *Framework for digital preservation of electronic government in Ghana* (Doctoral dissertation), University of Kwa Zulu Natal, Unpublished. <https://www.ajol.info/index.php/jsasa/article/view/189859>
- Ajiboye, B. A., & Arowolo, R. O. (2021). Format preference and utilisation of Library information resources by Undergraduates of Public Universities in a Nigerian State. *Library Philosophy and Practice*. <https://digitalcommons.unl.edu/libphilprac/6696/>
- Chung, A. C. W. (2020). Cost Issues in Digitization and Preservation: A Case Study of a Small-Scale Music Library. In *Digital Libraries and Institutional Repositories: Breakthroughs in Research and Practice* (pp. 45-58). IGI Global. Retrieved from <https://www.igi-global.com/article/cost-issues-in-digitalization-and-preservation/206865>
- Emwanta, M. G., & Nwalo, K. I. N. (2013). Influence of computer literacy and subject background on use of electronic resources by undergraduate students in universities in South-western Nigeria. *International Journal of Library and Information Science*, 5(2), 29-42. https://academicjournals.org/article/article1379695325_Emwanta%20and%20Nwalo.pdf
- Farrokhi, F. (2012). Rethinking Convenience Sampling: Defining Quality Criteria. In *Theory and Practice in Language Studies*, 2 (4): 784-792. Retrieved from

- <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.348.3490&rep=rep1&type=pdf#page=140>
- Gole, A., Joshi, R., & Kufeldt, P. A. (2020). U.S. Patent No. 10,642,508. Washington, DC: U.S. Patent and Trademark Office. Retrieved from <https://patentimages.storage.googleapis.com/f9/38/07/260c3b138b475f/US20170277451A1.pdf>
- Iyanda, D. F., & Opele, J. K. (2015). Iyanda and Opele - Managing Print and Non-Print Resources in Nigerian Tertiary Institutions. *Elixir Library Science*, 85(1), 34452–34456. https://www.researchgate.net/profile/Jacob-Opele/publication/341398668_Iyanda_and_Opele_2015_-_Managing_Print_and_Non-Print_Resources_in_Nigerian_Tertiary_Institutions/links/5ebe516592851c11a867e610/Iyanda-and-Opele-2015-Managing-Print-and-Non-Print-Resources-in-Nigerian-Tertiary-Institutions.pdf
- Kelle, U. (2006). Combining qualitative and quantitative methods in research practice: purposes and advantages. *Qualitative research in psychology*, 3(4), 293–311. doi/abs/10.1177/1478088706070839
- Khan, M. T., & Ameen, K. (2020). An Assessment of Effectiveness of GCU Library Services in Fulfilling Users' Needs and Demands. *Pakistan Library & Information Science Journal*, 51(3). <https://bit.ly/3s95s5g>
- Lee, J. P. (2019). Personal Experiences with Auditory Verbal Hallucination and Extrasensory Perception. *Schizophrenia bulletin*. <https://doi.org/10.1093/schbul/sbz008>
- Lin, X., Liu, J., Hao, J., Wang, K., Zhang, Y., Li, H., & Tan, X. (2020). Collinear holographic data storage technologies. *Opto-Electronic Advances*, 3 (03), 190004. <http://www.ojournal.org/J/OEA/Article/>
- Mane, M. B., & Panage, B. M. (2015). Development of Library Portal– In Print and Non-Print Era. *International Journal of Advanced Library and Information Science*, 3(1), 121–125. <https://doi.org/10.23953/cloud.ijalis.240>
- Mbwete, R., (2015). The implications of social economic transformation for social protection among old people in Tanzania (Doctoral Dissertation Open University of Tanzania): Unpublished. <http://repository.out.ac.tz/1096/>
- Mubofu, C., Mambo, H., & Samzug, A. (2020). Academic libraries and information resources preservation strategies: past, present and the way forward. *Covenant Journal of Library and Information Science*, 3(1). <https://journals.covenantuniversity.edu.ng/index.php/cjlis/article/view/2142>
- Newman, W. L. (2000). Social research methods, 2nd edition, London, Prentice Hall
- Ntulo, G. R., (2017). Provision of Agricultural Information services to Small Scale Farmers in Rukwa Region, Tanzania, PhD Dissertation unpublished MOI University. <http://41.89.160.13:8080/xmlui/handle/123456789/934>
- Oluwaseun, A. F., Ottong, E. J., & Ottong, U. J. (2017). Preservation of Library Resources in Nigeria Universities: a Study of Collections in Cross River State Universities. *Communications of the IIMA*, 15(3), 4. <https://scholarworks.lib.csusb.edu/ciima>
- Pambayun, K. G., (2021). Digital Libraries during Covid-19 Pandemic: A Bibliometric Analysis and Information Mapping. *Indonesian Journal of Librarianship*. 2(1), pp.17-30. DOI: <https://doi.org/10.33701/ijolib.v1i2.1416>
- Rutto, D., & Yudah, O. (2018). E-books in university libraries in Kenya: Trends, usage, and intellectual property issues. In *Handbook of Research on Managing Intellectual Property in Digital Libraries* (pp. 120–141). IGI Global. <https://www.igi-global.com/chapter/e-books-in-university-libraries-in-kenya/188546>

- Saka, K. A., Babalola, G. A., Ahmed, A. O., & Mohammed, A. A. (2020). Influence of Preservation Techniques and Access to Digital Resources on Research Outputs of Academic Staff in Federal University Libraries in Northern Nigeria. *Library Philosophy and Practice*, 1-41. <https://core.ac.uk/download/pdf/334983601.pdf>
- Samiei, M. (2020). Digital preservation: Concepts and strategies. *Journal of Advanced Pharmacy Education & Research* | Oct-Dec, 10 (S4). <https://japer.in/storage/models/article/TwhtVZp9vmT8y1KNZFMYhqGkigrDUovkNKBo3bpTzc3dyTxeysdlzJFU9VQ5/digital-preservation-concepts-and-strategies.pdf>
- Saunders, M, Lewis, P. & Thornhill, A. (2012). *Research Methods for Business Students*. 6th edition. Harlow: England; Pearson Education Limited. <https://urlshortner.org/gnU2Y>
- Schement, R. J. (2002) (ed.). *Encyclopedia of communication and information*. Gale group Thomson learning, New York.
- Stewart, L. A. (2000). Choosing Between Print and Electronic Resources. *The Reference Librarian*, 34 (71), 79-97. https://doi.org/10.1300/j120v34n71_07
- Umana, S. P. (2019). Digital preservation in institutional repositories in Namibian academic libraries: A case study of the Namibia University of Science and Technology (NUST) and the University of Namibia (UNAM) (Doctoral dissertation, University of Namibia). https://repository.unam.edu.na/bitstream/handle/11070/2908/umana_2020.pdf?sequence=1&isAllowed=y
- Vivek, V. V., Pradeesh, E. L., Natarajan, N., Pravin, M. C., & Prabhu, S. R. (2020). Development of a system to assist in library to automate the book handling process. In *IOP Conference Series: Materials Science and Engineering* (Vol. 995, No. 1, p. 012018). IOP Publishing. <https://iopscience.iop.org/article/10.1088/1757-899X/995/1/012018/pdf>