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Preservation Practices of Information Resources in Public University Libraries in Tanzania

Strategien zur Erhaltung von Informationsressourcen in Bibliotheken öffentlicher Universitäten in Tansania

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Abstract: The present study examined the preservation practices for information resources in seven public university libraries in Tanzania. Convenient and purposive sampling techniques were used to recruit library staff and library directors respectively to participate in the study. Data were collected through questionnaires and semi-structured interviews. The quantitative data obtained from the questionnaires were analysed using the Statistical Product and Service Solution (version 20) software while the qualitative data from the interviews were analysed using the thematic data analysis method. Regarding the effective preservation approaches for information resources, the study established that binding, digitization, migration, and emergency preparedness plans were highly cited. The following were the recommended preservation approaches for adoption in public university libraries: digitization, refreshing, proper shelving, and cleanliness of all library areas, migration, technology preservation, and binding. From the findings, it was concluded that public university libraries have a variety of preservation approaches for both print and digital information resources. The study recommends that policymakers and the Ministry of Education, Science, and Technology should train librarians in skills that they can apply in preserving information resources using modern technologies.

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Zusammenfassung: In der vorliegenden Studie wurden Strategien für die Erhaltung von Informationsquellen in sieben öffentlichen Universitätsbibliotheken in Tansania untersucht. Mittels Zufallsstichproben wurden Bibliotheksmitarbeiterinnen und -mitarbeiter bzw. Bibliotheksleiterinnen und -leiter für die Teilnahme an der Studie ausgewählt. Die Daten wurden anhand von Fragebögen und halbstrukturierten Interviews erhoben. Die aus den Fragebögen gewonnenen quantitativen Daten wurden mit dem Programm Statistical Product and Service Solution (Version 20) ausgewertet, während die qualitativen Daten aus den Interviews mit der Methode der thematischen Datenanalyse analysiert wurden. Am häufigsten wurden die folgenden Erhaltungsstrategien genannt: Bindung, Digitalisierung, Datenmigration und Erstellung von Notfallplänen. Folgende Maßnahmen zur Bewahrung von Informationsquellen werden für öffentliche Universitätsbibliotheken empfohlen: Digitalisierung, Auffrischung, geeignete Regale, Sauberkeit in den Bibliotheksräumen, Datenmigration, Erhaltung von Technologien und der Bindung. Aus den Ergebnissen wurde geschlossen, dass öffentliche Universitätsbibliotheken eine Vielzahl von Erhaltungsstrategien sowohl für gedruckte als auch für digitale Informationsquellen haben. Die Studie empfiehlt den politischen Entscheidungsträgern und dem Ministerium für Bildung, Wissenschaft und Technologie, in der Ausbildung von Bibliothekarinnen und Bibliothekaren die notwendigen Fähigkeiten zur Bewahrung von Informationsquellen unter Verwendung moderner Technologien zu vermitteln.

Schlüsselwörter: Bestandserhaltung, Informationsquellen, Bestandserhaltungsstrategien, Universitätsbibliotheken

1 Introduction

University libraries are regarded as the heart of higher education institutions and they collect information to meet the needs of their clients. Besides, they preserve valuable information resources to serve the community of higher education institutions such as students, lecturers, and researchers. Information resources play a significant role in university libraries since they provide the information services necessary for academics. Libraries fulfil the mission, vision and goals of higher education institutions by availing reliable information to the community for learning, teaching, research and consultancy services which are the main responsibility of any higher education institution. Ntulo (2017) established that

university libraries possess information resources that need to be protected for the current and future generations.

Such information resources include books, periodicals, maps, compact disks (CDs), theses, and dissertations available in both formats print and electronic. Principally, these information resources when properly preserved are significant in resolving societal problems (Singh and Kumar 2018) because they are a source of information that serves both researchers and laypersons when confronted with an information need. Qutab, Bharti, and Ullah (2014) maintain that the preservation of library materials aims at protecting intellectual content for future generations and for sustainable information services provisions to the current generation. Furthermore, Oluwaseun, Ottong, and Ottong (2017) established that the preservation of information resources refers to the provision of the highest care to library information resource collections so that they can have a long life span. Preserving information resources plays an important role in ensuring that previous information and memories are retained for current and future generations but also for the lifelong learning. It is the preservation of information resources that guarantees the existence of informative, educative and historical materials that are important for current and future generations.

Despite the important role of information resources in universities, their deterioration rates are alarming and have received less attention in most academic libraries. The preservation theory by John Ruskin suggests that it is important to instantly address deterioration of information resources in order to avoid future conservation expenses (Niglio 2013). John Ruskin believes that preservation is the art of keeping items as close as possible to their original state using continuous repair, stabilisation, and maintenance. There must be an agreed and standardised approach to be adopted by all preservation administrators (Mubofu, Mambo, and Samzugi 2020). This preservation approach contradicts any type of neglecting objects at danger today for preserving, conserving, and restoring them later.

The approaches used in protecting information resources from damage vary depending on the format of the information resource being preserved. Since most public university libraries operate in a hybrid system, the librarians need to have knowledge, skills, and experience of preserving both print and digital information resources using different approaches. However, Ashley-Smith (2016) found that there is a risk that there will be fewer opportunities to acquire and maintain the skills required for high-level hands-on conservation, underscoring the significance of having knowledge, experience, and skills in the conservation process. That means the preservation administrators need to have background knowledge of the information being preserved. This helps the preservation administrators to apply the right solution to the right problem.

University libraries in Tanzania are abundant in print and non-print information resources that enable the transmission of knowledge from one generation to the next, just like other types of libraries. University libraries cannot be intellectual centers unless their collection of information resources, which forms the core of their activities, is adequately preserved, conserved, and restored. If preservation practices are not satisfactory, there will be no sustainable information services provision in university libraries.

According to observations made at university libraries in Tanzania, some of the information resources they have are new and some are outdated. These outdated sources of information include books, CDs, diskettes, dissertations, newspapers, and periodicals that contain crucial data. As a result, maintaining access by academics and the general public is made possible by the preservation of these information resources (Komba, Nawe, and Manda 2017; Ndenje-Sichalwe, Ngulube, and Stilwell 2011; Nkebukwa 2016).

The present study examined the preservation practices of information resources in Tanzania with specific reference to seven public university libraries. It was guided by two specific objectives:

- i. To assess effective preservation approaches for information resources and
- ii. To determine recommended preservation approaches for adoption in public university libraries.

2 Literature Review

2.1 Information Resources Preservation Approaches

The preservation of information resources is important to its continued utilisation for personal and societal development. It is the preservation of information resources that guarantees the sustainable provision of information services in various information centres. In view of this, several studies have been conducted to investigate the relevant preservation and conservation approaches that could be employed to protect information resources and to prolong their life span. Dada (2021) conducted a study on the preservation of information resources in selected rural (public) libraries in Southern Nigeria. The study established that dusting and cleaning of shelves, books and the engagements of humans to secure information resources were the most recommended approaches used to secure library information resources.

Moreover, Khafidlin (2021) studied ancient manuscript preservation at Museum Ranggawarsita Library Collection Semarang in Central Java and the results suggested that proper handling of manuscripts, control of temperature and

humidity, dusting, treatment, and restoration were the recommended preservation approaches for safekeeping the manuscripts for current and future generations. Similarly, Fatima and Fatima (2021) surveyed the preventive conservation activities in the National Library of India and the survey findings revealed that preservation approaches such as pest management, climate control, access system, proper storage, binding, and disaster planning were used by the library to protect and safeguard the available information resources.

Although the study findings by Dada (2021), Khafidlin (2021), and Fatima and Fatima (2021) revealed the approaches to secure information resources from quick deterioration, it seems the proposed approaches mainly apply in the preservation and conservation of print materials. This implies that the consulted libraries mainly consisted of printed information resources and to a lesser degree of electronic information resources. However, strategies such as climate control, access system, proper storage, and disaster planning will also be useful for electronic information. A library being the source of data, the need to preserve, conserve and restore information resources in all formats found in libraries is significant (Mubofu and Mambo 2021).

Another study by Friday and Eze (2021) on the digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria showed that information space and migration were the most common approaches adopted for preserving e-theses and dissertations in the university libraries. According to Awamleh and Hamad (2022) digital preservation has been a big challenge in providing reliable and trusted information for sustainable e-government services; however, institutional repository has proved to be the best digital preservation approach to be adopted especially in academic libraries. Institutional repositories have a mechanism which monitors and notifies when the information representation is outdated or they are no longer viable. Additionally, preservation strategies like refreshing (which involves moving digital data from an outdated physical storage medium to a more up-to-date one before the former degrades), digitization, migration, technology preservation, emulation, and institutional repositories have been linked to the long-term accessibility of digital information resources (Friday and Eze 2021; Ilo et al. 2020; Namutebi 2019; Samiei 2020; Umana 2020). In the process of preserving digital information resources the following steps have to be taken:

- Identify and evaluate a collection,
- Plan for technology,
- Human and financial resources,
- Find a reliable digital preservation system (consider size, server, and storage),
- Ensure authenticity of objects, and
- Recognize intellectual property rights.

In the whole processes of digital preservation, administrators should consider copyright issues. Otherwise, problems may arise with the long-term preservation and access of the information (Haley 2021).

3 Research Methodology

The present study was conducted in the libraries of the following public universities: Moshi Cooperative University (MoCU), Sokoine University of Agriculture (SUA), Mzumbe University (MU), Ardhi University (ARU), University of Dar es Salaam (UDSM), Open University of Tanzania (OUT) and Muhimbili University of Health and Allied Sciences (MUHAS). According to the 2020 official website of the Tanzania Commission for Universities (TCU) (www.tcu.go.tz), Tanzania had 34 universities at the time the present investigation was done. Among these, only 11 are fully-fledged public universities but some of these were not included in the study for various reasons. For instance, Mbeya University of Science and Technology was excluded from the study because it was just elevated to the status of a higher-education institution while the Mwalimu Julius Nyerere University of Agriculture and Technology was still in the implementation stage. It would have been appropriate to include all the 34 universities in the study but given the resource constraints in terms of time and finance, the study included only seven public universities with similar characteristics, for instance, all these universities are funded by the government.

Additionally, the selected libraries have well-equipped collections with a long history of information service provision which made them good representatives of the other academic libraries in Tanzania. Besides, the selected academic libraries have been in existence for several years; therefore, one may conclude that they have a long experience of collection development as well as the preservation of library information resources.

A total of 354 library staff and library directors from the selected university libraries under study served as the study population and sampling frame for this case. The study used a mixed research approach whereby both qualitative data and quantitative data were collected. Furthermore, the study adopted a descriptive research design as it aimed at describing the state of affairs concerning preservation practices in public university libraries. Sample size selection of this study was based on Gay and Diehl (1992) who states that for a small sampling frame of less than one hundred (100) units, there is little point of sampling and thus, a survey of the entire sampling frame is advised. Additionally, for the sampling frame of up to five hundred (500) units, fifty (50%) of the total sampling frame should be sampled and if the sampling frame is between 600 and 1500, then

twenty (20%) of the sampling frame should be sampled. The sampling frame sampled for this study was 354 that falls under the second category and thus, 170 respondents which were equivalent to ~50% of the sampling frame was selected as a study sample size. Generally, the number of respondents acceptable for a study depends upon the type of research involved – descriptive, correlational, or experimental (Gay and Diehl 1992).

In the present study data were collected using questionnaires that were administered to 170 library staff members. All 170 members answered the questionnaires' and returned them for further analysis. The response rate was 100% and this was attributed to the fact that the researchers selected competent research assistants in the libraries under study to assist in collecting data to their colleagues but also the respondents were not allowed to go with the questionnaires outside their libraries, so, all the questionnaires were filled in and returned for analysis on time. Library staff fulfils the organizations' missions and objectives by availing the required information to library users for addressing their information needs. It is the library staff who can easily detect the damage of library information resources and recommend the best strategy to preserve, conserve and restore it to its original condition for further use.

Convenience sampling was adopted 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 and Mahmoudi 2012; Saunders, Lewis, and Thornhill 2012). An in-depth interview was conducted with seven library directors who were purposely included in this study as they were considered rich information sources, custodians of preservation policy, guidelines, and the ones who solicit funds for the preservation in the university libraries. Quantitative data from the questionnaire were coded and entered in the Statistical Package and Service Solution (SPSS, version 20) software for further analysis. On the other hand, thematic and content analysis was used to analyse qualitative data from the in-depth interview in this study (Rubin and Rubin 2011). All stages of analysis by Braun and Clarke (2014) were followed.

4 Study Findings

4.1 Effective Preservation Approaches for Information Resources

The respondents were asked to reveal the preservation approaches for information resources that they thought effective in safeguarding, protecting, conserving,

Table 1: Effective information resources preservation approaches ($n = 170$).

| Preservation approaches | Responses | | |
|---------------------------------------|-----------|-------|-------|
| | SA (%) | A (%) | D (%) |
| Binding | 97.6 | 1.2 | 1.2 |
| Digitization of information resources | 96.5 | 2.9 | 0.6 |
| Migration | 95.9 | 2.4 | 1.8 |
| Emergency preparedness plan | 93.5 | 5.3 | 1.2 |
| Care and good handling policies | 80 | 18.2 | 1.8 |
| Emulation | 75.3 | 22.9 | 1.8 |
| Climate control | 62.4 | 36.5 | 1.2 |
| Photocopying | 45.3 | 44.1 | 10.6 |
| Encapsulation | 33.5 | 50.6 | 15.9 |
| Lamination | 19.4 | 54.1 | 26.5 |

SA = Strongly agreed, A = Agree, D = Disagreed.

and preserving library information resources. Ten information preservation approaches were listed, and the respondents were required to cite the approaches that they strongly agreed, agreed, or disagreed to be adopted in their libraries. The findings are summarised in Table 1.

The results clearly showed that binding, digitization, migration, emergency preparedness plan, care and good handling policies were strongly agreed upon as effective information resources preservation approaches in public university libraries. On the other hand, lamination, encapsulation, and photocopying were disagreed upon as effective information resources preservation approaches in public university libraries in Tanzania.

4.2 Recommended Information Resources Preservation Approaches

The respondents were asked to recommend the relevant preservation approaches for information resources for adoption in public university libraries. It was expected that library staff were likely to recommend the approach that they were knowledgeable with and could apply. The findings are summarised in Table 2.

The findings show that cleanliness of libraries where information resources are kept, educating library users on how to handle and use information resources, and migrating information resources from obsolete storage media to modern storage media were the most cited preservation approaches considered as highly recommended. Others were proper shelving of library materials to allow free flow of air, digitising all important rare information resources and storing them in

Table 2: Recommended information resources preservation approaches ($n = 170$).

| Preservation Approaches | Responses | | | | | |
|----------------------------------|-----------------|------|------------------------|------|--------------------|------|
| | Not recommended | | Moderately recommended | | Highly recommended | |
| | F | % | F | % | F | % |
| Digitization | 1 | 0.6 | 23 | 13.5 | 146 | 85.9 |
| Refreshing | 1 | 0.6 | 31 | 18.2 | 138 | 81.2 |
| Proper shelving | 1 | 0.6 | 32 | 18.8 | 137 | 80.6 |
| Good cleanliness of library | 1 | 0.6 | 36 | 21.2 | 133 | 78.2 |
| Migration | 2 | 1.2 | 42 | 24.7 | 126 | 74.1 |
| Technology preservation | – | – | 49 | 28.8 | 122 | 71.8 |
| Binding | – | – | 54 | 32.9 | 117 | 68.8 |
| Educating library users | – | – | 67 | 39.4 | 103 | 60.6 |
| Installation of air conditioners | – | – | 85 | 50 | 85 | 50 |
| Encapsulation | 16 | 9.4 | 96 | 56.5 | 58 | 34.1 |
| Fumigation | 10 | 5.9 | 105 | 61.8 | 52 | 30.6 |
| Lamination | 11 | 6.5 | 112 | 65.9 | 47 | 27.6 |
| Weeding | 22 | 12.9 | 101 | 59.4 | 47 | 27.6 |
| Microfilming | 96 | 56.5 | 28 | 16.5 | 46 | 27 |
| Provision of adequate security | 1 | 0.6 | 128 | 75.3 | 41 | 24.1 |
| Deacidification | 95 | 55.9 | 66 | 38.8 | 9 | 5.3 |

F = Frequency, % = Percent.

modern storage facilities, technology preservation, binding, and refreshing. Although library staff strongly recommended that these preservation techniques be implemented in their libraries, observations show that not all of the cited techniques were implemented in the libraries under study. It is therefore critical for library management to train library staff so that they can begin using these techniques to preserve available information resources for current and future use.

The least cited preservation approaches for information resources were fumigating regularly, deacidifying highly acidic material, and encapsulation. Others were the provision of adequate security to prevent theft, installation of air conditioners for temperature regulation, microfilming, lamination, and weeding. The findings of this study are further discussed in the following section. Although researchers' observations indicate that some of the paper-based material was preserved using these methods, some preservation techniques were the least frequently cited. The library staff may have been aware of some of these strategies, but they were reluctant to advocate for their use.

5 Discussion

5.1 Effective Information Resources Preservation Approaches

The first objective of this study was to examine effective preservation approaches in public university libraries. The findings are discussed in the following subsections.

Binding: The study results showed that 166 out of 170 respondents, which were more than 97% of the interviewed library staff, strongly agreed that binding was an effective preservation approach. This implies that the university libraries had been using this as the main preservation approach. Binding is a practice of using new cover materials to protect semi-current records from deterioration (Mubofu, Mambo, and Samzugi 2020). Binding library information resources is an approach that aims at securing material and protecting it from loss of information. Researchers' observations reveal that, along with photocopying and appropriate book shelving, binding is the preservation technique most frequently used in Tanzanian university libraries. According to Ilo et al. (2020) binding is a preventive activity most commonly implemented in libraries.

Digitization: This is another effective approach to preserving library information resources as identified by 96.5% of the respondents that strongly agreed with this approach. According to Namutebi (2019) digitization is the process of creating a digital image and then presenting it on a computer or local area network/internet. Digitization of damaged information resources can maintain access to users. Anyaoku, Echedom, and Baro (2018) noted that after digitization, the next step is digital preservation for the sake of ensuring that the digital information resources are available in the future when needed. However, librarians involved in digitization must be well skilled and capable of assigning the right metadata to the information being digitised to enable continued accessibility.

Migration: The study revealed that 95.9% of the respondents strongly agreed that migrating information resources from one storage medium to another was an effective approach to ensure the availability of information since information will be retrieved from multiple backups. The findings imply that there is a need of having many backups of the information resources currently available in university libraries so that they can be available in the future when the need arises. The study by Namutebi (2019) concluded that migration of library information resources is important since it can prevent possible loss and deterioration and will stimulate the continued use since multiple backups are made.

Emergency preparedness plan: More than 90% of the interviewed respondents in the present study strongly agreed that an emergency preparedness plan

was an effective approach for the long-term preservation of information resources. This demonstrates that library staff were aware that emergency preparedness plans could reduce or prevent potential losses, offer appropriate and timely aid to disaster victims, and facilitate a speedy and effective recovery. Moreover, the Carnes (2018) study, which was carried out at the National Library of Medicine in the United States, found that the majority of libraries have effective emergency preparedness plans and employ a variety of methods for protecting library information resources.

Care and good handling policies: The findings showed that 80% of the respondents strongly agreed that care and good handling policies were effective preservation approaches. Concerning care and handling policies, the study by Neumbe (2019) has recently established that the formulation and implementation of care and good handling policies are significant because without policies, information resources will be handled carelessly and exposed to harsh conditions such as too much sunshine leading to fading of printed information resources and ultimately to their loss. Khafidlin (2021) further revealed that the proper handling of information resources is fundamental and needs to be guided by well-formulated policies.

Emulation: It was also strongly agreed by 75.3% of the respondents that emulation was an effective preservation strategy. Emulation is an approach that uses one computer device or software program to imitate the behaviours of another device to obtain the same results and it focuses on the original environment in which a file can be rendered by keeping documents readable for a long time (Adu 2015). The findings implied that emulation is an important approach to be practised in university libraries. However, it has been argued that migration is the preferred preservation approach (Ilo et al. 2020).

Climate control: Climatic conditions like humidity, temperature, and light have a great effect on information resources. In the present study, 62.4% of the respondents strongly agreed that climate control is an effective approach to be adopted in preserving library information resources. The findings imply that library staff is knowledgeable about the effects climate has on library resources. The study by Turhan, Arsan, and Akkurt (2019) on the “Impact of climate change on the indoor environment of historic libraries in Mediterranean climate zone” established that libraries store valuable information resources in both print and non-print format in unconditioned environments which were envisaged to highly affect the library resources due to temperature and relative humidity changes. Additionally, Fatima and Fatima (2021) revealed that climate control was an approach adopted in the preventive conservation of library materials in the National Library of India and in many other places. This shows the importance of

controlling the climate conditions in facilities where information resources are preserved.

One of the interviewed library directors explained that:

Climate control in the library environment is crucial since if it is left uncontrolled the library materials can quickly become unfit for use by readers due to combined effects of climate change fluctuations that means the rise and fall of temperature and humidity (MU, 2020)

Encapsulation: In the present study, 50.6% of the respondents agreed that encapsulation was an effective preservation approach. The objective of encapsulation is to overcome the challenges of the technological obsolescence of file formats by making the details of how to interpret the digital object part of the encapsulated information resource. Anyaoku, Echedom, and Baro (2018) define encapsulation as an essential element of many emulation approaches, and it also plays a key part in the preservation of information resources. The encapsulation preservation approach according to Anyaoku, Echedom, and Baro (2018) involves creating the original application that was used to create or access the digital object on future computer platforms. This implies that library staff must be aware that encapsulation is a great way of preserving the digital information resources and thus library management should ensure that they provide the necessary infrastructure that could facilitate encapsulation practices.

Besides, the findings from the interviews revealed that handling information resources carefully and considering climatic conditions were key approaches to the safekeeping of library information resources. Regarding this approach, two library directors claimed that:

If information resources like books and newspapers are not preserved in good condition they would come into contact with high humidity, excessive sunlight which are likely to compromise it to the extent that they could not be readable ... (SUA and OUT, 2020)

Lamination: The study results showed that more than 50% of the respondents agreed that laminating information resources was an effective preservation approach. Lamination is a preservation approach using plastic adhesives to seal original materials in order to prolong their lifespan (Namutebi 2019). Lamination is used to preserve government documents that exist in the form of charts and certificates.

Photocopying: Regarding photocopying, 45.3% of the respondents strongly agreed that it was an effective preservation approach. Although less than 50% of the interviewed respondents consider photocopying as a relevant preservation and conservation approach, it is still the most practised preservation activity in university libraries in Nigeria (Ilo et al. 2020). According to these scholars,

photocopying print resources and using the copy instead of the original is far more economical than digitizing where expensive hardware and software are required.

5.2 Recommended Preservation Approaches

The second objective of this study was to assess the approaches recommended for information resources preservation in selected public university libraries. The findings from the study are further discussed in the following subsections

Digitization: The study showed that 85.9% of the respondents highly recommended the digitization of all important and rare information resources and storing digitised electronic documents in modern electronic storage facilities like institutional repositories for easy access and retrieval. Researchers' observation shows that, out of seven university libraries under study, only five had institutional repositories for the long-term preservation of digitized information resources. Umana (2020) noted that a successful and reliable institutional repository is measured against its ability to provide long-term access to the stored content. Thus, achieving long-term access to information resources is dependent upon effective and efficient digital preservation practices. For library staff and library management, digitization is an important way to reformat fragile and endangered study-based research library materials so that they are properly digitized for use now and in the future (Ambika 2018).

Refreshing: According to the study findings, 81.2% of respondents strongly recommended that digital information resources be refreshed. Refreshing is a method of preserving digital information resources to assist librarians in storing and safeguarding library information resources for future use. However, it was not determined whether the library staff possessed the necessary skills to preserve information resources by refreshing. Based on the results of a previous study by Kavishe and Dulle (2016) technical digital preservation skills are mandatory but seem to be lacking among librarians managing digital information resources.

Proper shelving: Proper shelving which allows free flow of air was highly recommended by 80.6% of the respondents. When books are stacked too closely, their spines may come unattached or even fall out when they are removed from the shelf (Chattopadhyay 2007). In order to properly shelve and retrieve information resources from their designated storage locations, library staff must receive the necessary training.

Cleanliness of storage areas: It was also noted that cleanliness of the storage areas was highly recommended by 78.2% of the respondents. The study by Khan and Ameen (2020) reported that cleanliness of libraries is not only a good approach in protecting library information resources from attack by insects and pests but is

also a good way of attracting library patrons to make use of the resources for addressing their information needs. Dada (2021) also established that cleaning library shelves and books is the most common preservation approach used by public libraries in rural Nigeria. This implies that library cleanliness is a preservation approach that should be adopted in university libraries since it seems to be understood and practised by most of the information centres.

Migration: It was revealed that 74.1% of the respondents highly recommended migrating information resources from obsolete storage media to modern storage media. Migration is typically conducted to address the problem of system errors that might compromise digital information accessibility. This is a preservation approach that ensures the long-term accessibility of digital information resources in various libraries (Friday and Eze 2021). Even though migration was a highly recommended strategy, observations show that none of the university libraries under study were executing it.

Technology preservation: Technology preservation was highly recommended by 71.8% of the respondents in the present study. According to Umana (2020), technology preservation ensures ongoing access to digital information resources by keeping the old technology used to create and access digital information in its original form and environment in the event of technological change. Although library staff strongly recommended this method, it does not imply that the libraries under study used it to preserve their information resources. Technology preservation is a method of overcoming technological obsolescence by preserving software and hardware used to access a digital resource (Samiei 2020). Technology preservation can also refer to the act of preserving a system's technical foundation, such as its operating system, original application software, media drives, and related components; this solution is sometimes referred to as a "computer museum" solution.

Binding: 68.8% of the respondents highly recommended the binding of library information resources to protect them from deterioration. According to Kavishe and Dulle (2016) and Saka et al. (2020), libraries face a shortage of skilled preservation administrators, and as a result, preservation and conservation practices that could be carried out by library staff in their respective libraries have been commercialized or externalised. Because deteriorated books and journals are not sent on time for binding, the quality of information services has suffered as a result of this situation.

Educating library users: It was further observed that 60.6% of the respondents highly recommended educating library users on how to handle and use information resources. This preservation approach can be conducted during the orientation period at the beginning of each semester to reduce the risk of damage due to poor handling. The study by Vivek et al. (2020) on "Development of

a system to assist in libraries to automate the book handling process” noted that during the book handling process, books may get damaged due to poor handling or over stacking which may lead to torn pages or separated pages and sections. Thus, Vivek et al. (2020) suggest the application of book handling robots that could return the books on shelves without any human involvement.

When asked about the best information resources preservation approach, library directors would recommend:

The best-recommended approach for preserving information resources be it digital or print is by educating the key stakeholders both users and library staff. For instance, library users should be taught how to carefully handle the information resources, for example how to retrieve books from the shelves without causing damage. (OUT and ARU, 2020)

Other library directors added that:

Library staff need training on how to preserve different types of digital information resources, for example, how to migrate and refresh digital information resources which are at risk due to technological obsolescence by transferring them to a new and modern media for continued accessibility (MUHAS and SUA, 2020)

Installation of air conditioners: 50% of the interviewed respondents highly recommended installation of air conditioners in libraries, while the same percentage of respondents moderately recommended it. These findings imply that the installation of air conditioners is likely to aid the preservation process since air conditioners lower the temperature.

Encapsulation: 56.5% of the respondents moderately recommended the encapsulation preservation approach. The encapsulation preservation approach is a hybrid approach that can be applied in preserving both digital and print information resources. In the context of digital resources, encapsulation means bringing together all digital resources or anything necessary to ensure access to the resource in question; by this approach, 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. According to Chattopadhyay (2007), encapsulation is a technique in which the frail paper is strengthened by transparent inert material (polyester or polypropylene) sealed along the edges.

Fumigation: A majority (61.8%) of the respondents moderately recommended fumigating information resources regularly to kill insects, pests, and other living organisms that could cause deterioration. Fumigation involves the use of insecticides and insect repellents. Madumere and Ekwelem (2020) suggest that fumigation is necessary as it controls the manifestations and growth of pests and insects living such as silverfish, cockroaches, booklice, termites, rats, mice, and

beetles in the library facility. It is mainly applicable in the preservation of paper-based material.

Lamination: 65.9% of the respondents moderately recommended the use of the lamination. The plausible reason for this is the fact that the lamination technique is irreversible and once a record is laminated, it is extremely laborious to remove the lamination in case of unwanted changes. However, Madumere and Ekwelem (2020) suggest the use of lamination as it is a good measure of protecting information resources from threats caused by water and urine dropping from living organisms like rodents. However, the nature of paper-based materials available in university libraries like books, dissertations, reports, journals, and newspapers would be highly challenging since it is not easy to laminate the pages of a book or those of a dissertation.

Weeding: 59.4% of those surveyed said they would moderately recommend weeding as a preservation strategy. Weeding, alternatively known as de-selection in the library context, refers to the process of removing unwanted information resources and those with little information value from the library collection to create a space for new information resources acquired by the library. According to Reed and Li (2020) weeding is a process in which the library staff review the resources in a given subject area based on criteria such as physical condition, relevance to the curriculum, duplication in an electronic format, and circulation statistics.

Regarding the weeding of information resources, one of the interviewed library directors explained that:

It is a good idea to practice de-selection in a library's collection to create space between the overcrowded stacks which may lead to damage of library information resources. A weeded collection reduces overcrowding in the stacks and hence provides a good environment for storage of information resources but also it allows easy detection of living organisms like mice and insects within the library facility. (UDSM, 2020)

Microfilming: Only 46 out of 170 library staff members highly recommended microfilming while a majority (>50%) of the respondents did not recommend it. The findings of this study contradict the previous findings by Saka et al. (2020) who revealed that microfilming was the major preservation approach recommended and adopted in university libraries in Nigeria. The findings of this study indicate that microfilm is no longer regarded as a user-friendly medium for accessing information and the library staff confirmed this.

Provision of adequate security: 75.3% of the interviewed respondents moderately recommended the provision of adequate security to prevent theft of library information resources. The findings implied that there has been a problem of theft of library materials in university libraries and the library staff suggested

tightening of the security systems in the study libraries. Adenike and Raliat (2020) have noted that students use handbags and confuse/divert the attention of library staff at the circulation desk when they want to steal information resources. 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 theft and mutilation. Although a library is a shared resource it cannot be left free without security for anyone to walk in at any time and do as they please.

Deacidification: The study findings revealed that more than 50% of the respondents did not recommend deacidification as a preservation approach. This could be attributed to a lack of expertise in this field brought on by the absence of internal conservation experts. Deacidification is the process of treating paper-based documents to neutralise the acids within them and prolong their life expectancy. Depending on the nature of the writing medium and the strength of the paper, less dangerous and more affordable methods of deacidification include the use of spray deacidification, ammonia gas deacidification, and aqueous deacidification (solution of calcium hydroxide and calcium bicarbonate) (Chattopadhyay 2007). Although this approach was not highly recommended by respondents in this study, Fan et al. (2020) reported that it is important to implement deacidification and reinforcement methods to extend the durability of library information resources on paper.

6 Conclusion and Recommendations

6.1 Conclusions

According to the study's findings, the most frequently mentioned preservation techniques in public university libraries were binding, digitization, migration, and emergency preparedness plans. The study also finds that migration, technology preservation, binding, proper shelving, and cleanliness of storage areas are the preservation strategies that respondents in public university libraries recommend. In conclusion, there is a match between several cited preservation approaches and recommended preservation approaches. This refers to binding, digitization, and migration. However, this study reveals a lack in emergency preparedness plans that are among the most frequently cited approaches are not perceived as recommended preservation approaches. Also, refreshing, proper shelving, cleanliness of storage areas, and technology preservation score high in recommendation, but still lack in practice. Here, we identify a need for further activities and improvements.

6.2 Recommendations

Based on the findings, the following recommendations are listed for the improvement of preservation of information resources in public university libraries in Tanzania.

- i. Policymakers and the Ministry of Education, Science, and Technology should help the university libraries and librarians in particular by training them to use modern preservation technologies to preserve information resources for current and future use.
- ii. University management in collaboration with other stakeholders should support preservation administrators financially so that they can attend various continuous professional development programs on preservation issues.
- iii. Public university libraries in collaboration with other stakeholders should establish a preservation consortium that will oversee preservation issues in libraries countrywide. Through a consortium for preservation, administrators would have a platform where they can share knowledge, skills, understanding, and practical experiences on how to jointly tackle various preservation challenges in libraries.

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