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Maintenance Practices of Born-Digital Archival for Effective Service Delivery in Academic Libraries in the South-east Zone of Nigeria

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Abstract
This paper sets to explore the maintenance practices of born-digital archival resources in academic libraries in South East, Nigeria. The maintenance practices of born-digital archival resources is of global interests particularly in academic institutions where information are created and generated digitally in accordance with the trends of events in this internet driven period. Several research findings show that lack of proper maintenance practices for born-digital archival materials can result in bit rot, inaccessibility of information and loss. The maintenance practices for non-digital archival resources are commonly found while those of born-digital archival resources are understudied especially in the academic libraries in developing countries such as Nigeria. Quantum's of born-digital archival resources are generated in the academic institutions on the course of their daily transactions of teaching, learning and research. Academic libraries serve maximally in terms of acquisition, maintenance of these resources digitally for continuous accessibility. A descriptive survey was employed, and the population consisted of 277 library staff. The instrument used for collecting data was questionnaire and data were analyzed using Statistical Packages for Social Sciences version 2.0, with mean scores, frequencies, and percentages used for data analysis. The findings revealed that CD ROMs, bibliographic databases, electronic books, digital photographs, institutional repositories, and software applications were available in academic libraries. The maintenance practices adopted for born-digital archival resources included technology preservation, data refreshing, emulation, and migration. The library staff in academic libraries, particularly in developing countries are to be conversant with current trends and innovations in maintenance practices of born-digital archival resources for relevance and accessibility.
Keywords: *Born Digital, Archival Resources, Maintenance Practices, Academic Libraries, Developing Countries*

1.1 Introduction

Maintenance practices for born-digital archival resources concern the collective efforts of library staff to ensure that information-bearing resources in digital formats are preserved and conserved for posterity. A born-digital resource is defined as "items created and managed in digital form" (Tolkien, 2019). Born-digital archival resources include electronic personal papers,

organisational records, manuscripts, financial information, web documents, digital photographs, documents (PDFs), digital manuscripts, electronic records of institutions, and datasets generated by researchers. These resources require proper maintenance.

According to Russell (cited in Sawant, 2014), archival digital resources maintenance involves maintaining digital data in digital form to ensure usability, durability, and intellectual integrity. This maintenance is vital for promoting increased visibility of resources, easing reference access, encouraging community engagement, and exchanging information among researchers (Kulhavy et al., 2017). Access to archival resources, whether digital or tangible, is restricted, unlike other library materials. Jaillant (2022) reveals that access can be denied to users of born-digital collections to protect data.

Generally, born-digital archival resources in libraries are maintained through technology preservation, data migration, data emulation, and institutional repositories for posterity and electronic accessibility. This paper focuses on maintaining library information resources with continuous value, known as archives, acquired digitally as born-digital archival resources in academic libraries.

One of the primary mandates of academic libraries is preserving knowledge. Libraries have historically preserved and disseminated information for future generations. However, with the advent of ICT, libraries shifted their focus from maintenance to accessibility of information resources, and born-digital resources pose challenges related to downsizing information resources due to technology inventors' policies (Ovenden, 2019). The National Library of Australia (cited by Ogunmodede and Ebijuwa, 2013) observed that collections of electronically stored information resources, such as CD ROMs and computer discs, are growing rapidly in academic libraries, making them impermanent.

Other factors contributing to the maintenance of born-digital resources include information explosion and growth, e-research, and the need for regulatory compliance and retention (Beafire, cited in Okoh and Sambo, 2014). Madumere and Ekwelem (2019) researched the deterioration of archival materials in academic libraries in tropical zones, identifying environmental, biological, chemical, and human factors, including disasters, as contributors to deterioration.

Moreover, researchers have long observed that born-digital resources have long-term preservation problems, are fragile and complicated, prone to deterioration, alterable, and deletable, requiring technologies to read them (hardware and software) (Day, 2006, and Asogwa et al., 2021). Therefore, maintaining born-digital resources in academic libraries is necessary for long-term accessibility and effective service delivery. Digital document maintenance aims to preserve digital data in digital format for usability, durability, and intellectual integrity (Russell, cited in Swant, 2014). Bote, Fernandez-feijoo and Ruiz (2012) argued that, in addition to preserving data integrity, technology surveillance is required to prevent format or support obsolescence.

In developed countries like the United States, authors write using computers and forward documents in electronic formats, whereas in the past, authors had drafts, manuscripts, and notes produced in text (Kraus et al., 2009). This has led to an increase in acquiring born-digital resources in libraries. However, processing these resources was found to be "localised and idiosyncratic". In developing countries like Africa, Masenya and Ngulube (2019) discovered that many university libraries have digitised their scholarly outputs and have functional institutional repositories, while others are in the process. However, Africa lacks digital preservation projects. The study conducted by Gbaje (2011) on digital preservation strategies in national information centres in Nigeria

revealed a gap in the area of assessing digital objects, as there is no framework for accessing them. Segaetho and Mnjama (2012:48) observed that "the maintenance of library and archival materials in Africa has not received sufficient attention". Consequently, in most developing countries, the maintenance of born-digital archival resources remains a challenge.

The "management of born-digital archival resources is still in its infancy" (A report from the American Library Community OCLC, as cited in Tolkien, 2019). Digital preservation is a current trend in modern libraries for managing digital information resources, in addition to being a challenging situation for the digital information society (Jharotia, 2018). The National Library of Australia, as cited by Ogunmodede and Ebijuwa (2013), reported that born-digital archival resources face issues such as obsolescence of computer media and software needed to read data files; bit rot, which refers to the sudden disappearance or corruption of a 'bit' of data, making files unreadable, etc. Matters such as technological obsolescence affect the longevity of digital information resources, especially if not handled properly (Bagley, 2017). Okoh and Sambo (2014) conducted a survey on awareness of digital preservation strategies among librarians in Nigeria. The study's findings showed that many libraries in Nigeria lack a digital preservation policy and suffer from a lack of training for librarians on digital preservation. Therefore, these are threats to proper control, storage, handling, security, copying, reformation, and migration needed for preserving and ensuring long-term accessibility of born-digital media for effective service delivery in academic libraries.

Archival maintenance practices for born-digital archival resources in academic libraries are crucial for extending the lifespan of information resources for posterity and ensuring efficient information service delivery in academic libraries. Enhancing the maintenance of born-digital archival resources will make these resources accessible to researchers, who can utilise them to transform into data-rich and impactful disciplines for the humanities (Tolkien, 2019). Furthermore, archival digital resources have continuous value, promote scholarship, and enlighten users. They also increase the value and strength of research work in an academic environment. Restrick (2019) highlighted the importance of archives in ethnographic and historical research, noting that they are created for researchers' use as they provide primary documentation of human activity. In doing so, the library offers effective services to users. Most importantly, the form of content determines the type of services and tools used to serve users in libraries, especially academic libraries (Kraus et al., 2009).

Service is vital in every service-oriented institution, such as academic libraries. Services involve the exchange of intangible, abstract, and unseen exchanges with individuals, which can be offered anywhere and cannot be possessed (Shostack, as cited in Marquez and Downey, 2015). However, service delivery means providing services to individuals or groups with defined needs. Effective service delivery means providing efficient services to meet clients' needs. In the context of academic libraries, Wilson and Tauber (as cited in Oyegunle, 2013) pointed out that academic libraries provide reference and lending resources in response to the needs of their parent institutions, offer education to users to expand their knowledge horizon, conserve knowledge, support teaching, research, and development, publish to promote academic visibility, and provide extension and interpretation services. Therefore, to ensure effective service delivery in academic libraries, maintaining born-digital archival resources is essential.

1.2 Statement of the Problem

Given to the shift from print to digital sources in libraries, the need to preserve digital materials becomes imperative. The sources must be accessible at all times through preservation. This study aims to specifically identify the kinds of born-digital archival resources available in academic libraries and the extent of adoption of maintenance practices for these resources. Additionally, this study seeks to contribute new knowledge on archival maintenance practices for born-digital materials to ensure effective service delivery in developing countries.

1.3 The Objectives of the Study

The general objective of the study is to find out the maintenance practices of born-digital archival resources for effective service delivery in academic libraries in the South East Geo-Political zone of Nigeria.

The specific objectives are to:

1. Ascertain the kinds of born digital archival resources available in academic libraries in Nigeria.
2. Find out the extent of adoption of maintenance practices for born digital archival resources in academic libraries in Nigeria.

1.4 The Research Questions

These research questions guided the study:

1. What are the types of born digital archival resources available in academic libraries in Nigeria?
2. What is the extent of adoption of maintenance practices for born digital archival resources in academic libraries in Nigeria?

2.1 Literature Review

2.2 Archival Maintenance Practices for Born Digital Archival Resources

Many maintenance initiatives have been established to preserve digital resources, including both born-digital and digitized materials. These initiatives aim to preserve digital archives and include ARKive, the Digital Preservation Coalition, the US National Digital Information Infrastructure and Preservation Programme, and the MetaArchive Cooperative (Cornell University Library, 2003). ARKive, a digital initiative, maintains video, audio, films, and other photographic materials. The Digital Preservation Coalition, a non-profit organization, contributes to ensuring the preservation of digital materials. The Digital Preservation Coalition in the UK and Ireland was established to preserve digital content and provide access to it (Jaillant, 2022). The MetaArchive is a collaborative effort between libraries to preserve digital infrastructure and knowledge by replicating and storing preserved files.

The maintenance of born-digital archival resources includes technology preservation, data refreshing, data emulation, and data migration (Masenya & Ngulube, 2019; Ismail & Affandy, 2018; Sawant, 2014; Ibegwam, 2010). Technology preservation involves replicating old hardware and software configurations, while data refreshing involves periodically copying digital resources from one physical medium to another (Sawant, 2014). Azim et al. (2018) postulated that data refreshing involves physically transferring resources, such as archival and library resources, for better storage and upgrading purposes. This is done to prevent format loss or access issues for users. Data emulation involves creating a new digital environment for the digital object, focusing on the hardware and software environment rather than the digital object itself. It also involves transferring digital content from one medium to another. Emulation preserves the authenticity of data, ensuring the original forms are maintained (Day, 2006). Data migration involves copying or converting digital objects from one technology to another, including their important properties (Thomas, 2006). It involves transferring data to newer environments, such as converting archival digital resources from one file format to another (e.g., Microsoft Word to Portable Document Format (PDF)) or from one operating system to another (e.g., Windows to GNU/Linux) (Garretti et al., 1996). However, Bagley (2017) suggested

that migration requires periodic repetition as technology platforms advance and change. In summary, technology preservation, data refreshing, emulation, and migration focus on maintaining digital information, including hardware, software, and digital content, for future use.

Storing archival resources is vital for extending their lifespan. The storage of born-digital and electronic archival resources is crucial, according to Keene (2001), who emphasized the need to address both the physical storage of digital archival resources and the means of processing the data to recreate the content. Moreover, digital resources can be easily copied and stored on various physical media, such as hard disks, optical media like Compact-Disc-Read-Only-Memory (CD-ROMs), magnetic tapes, and electronic chips. Similarly, Ezeani (2010) identified the commonly used storage devices in libraries, including computer hard disks, floppy disks or diskettes, Compact-Disc-Read-Only-Memory (CD-ROM), and Universal Serial Bus (USB) drives. The storage capacities of these devices vary, with computer hard disks storing up to 40 gigabytes, floppy disks storing 1-44 megabytes, CD-ROMs storing 650 megabytes, and USB flash drives storing hundreds of times the information found on a floppy disk. Ravat and Parmer (2021) reported that the Parliamentary Archives they studied do not store sensitive materials in the cloud, instead opting for local storage systems for born-digital archival materials. Therefore, the authors advocate for the use of local storage systems for storing digital archival contents in libraries. By the application of all these mentioned above, the life span of born digital archival resources are prolonged and maintained. The essence is to ensure the functionality and long time accessibility of archival digital resources for effective service delivery in academic libraries.

Generally, various types of information appear in digital forms. Ravat and Parmar (2021) identified these as emails, blogs, social networking websites, national election websites, and web photo albums. However, archival born-digital resources concern information resources that possess enduring value, despite existing in electronic or digital forms. Examples of born-digital archival resources found in academic libraries include compact disks, bibliographic databases, electronic books, digital photographs, software applications, and institutional repositories (Reitz, as cited in Chima and Nwokocha, 2015). According to Kulhavy et al. (2017), archival resources found in academic libraries also include CD-ROM drives, bibliographic databases, electronic texts and books, digital photographs, software applications, published documents, and ancillary materials useful for research and future interpretation of data.

3.1 Research Methodology

The study employed a descriptive survey design, deemed appropriate due to the sample comprising library staff and the need to solicit their opinions. The study's location was the South-East geo-political zone of Nigeria, encompassing five states: Abia, Anambra, Ebonyi, Enugu, and Imo. South-East geo-political zone of Nigeria is one of the Nigeria's six geo-political zones and is home to academic institutions, including polytechnics, colleges of education, and universities. The population consisted of 277 library staff from 12 academic libraries in South-East Nigeria, all of which were government-owned and funded. A multistage sampling technique was utilized, with stratified random sampling employed in the first stage to select 12 institutions (6 state-owned and 6 federally owned). This ensured adequate representation of both state and federal academic institutions. In the second stage, purposive sampling was used to select two academic libraries from each type of institution (federal and state universities, colleges of education, and polytechnics). All library staff working in or having worked in the archives of these institutions were included in the study, with no sampling required due to the small number. The researchers developed and administered structured questionnaire, which were used to collect data. The response rate was 100%, with

the entire distributed questionnaire designed for this study retrieved. Data analysis was conducted using SPSS version 2.0, with frequencies and percentages used to determine the availability of archival born-digital resources. Mean scores and standard deviations were employed to assess the extent of adoption of archival maintenance practices for born-digital resources. The criterion mean was set at 2.50 or above on a four-point rating scale.

4.1 Results and Data Analysis

Table 1: List of Academic Libraries Surveyed and their Years of Establishment

S/N	Federal Universities	Year Established
1.	Abia State Polytechnic, Aba	1992
2.	Abia State University, Uturu	1981
3.	Akanu Ibiam federal Polytechnic, Uwana-Afikpo	1981
4.	Alvan Ikoku College of Education, Owerri	1965
5.	Ebonyi State College of Education, Ikwo	2001
6.	Ebonyi State University	2000
7.	Federal College of Education, Eha-Amufu	1981
8.	Federal Polytechnic, Nekede	1977
9.	Federal University of Technology, Owerri	1980
10.	Institute of Management and Technology, Enugu	1965
11.	Nwafor Orizu College of Education, Nsugbe	1976
12.	University of Nigeria, Nsukka	1960

Table 1 shows the list of academic libraries surveyed in South-East, Nigeria and years they were established. Their years of establishment show that they have existed for years and are expected to have generated many born digital archival records. The selection of the universities, colleges of education and polytechnics was done based on multistage sampling technique. At the first stage, stratified sampling technique was used to select 12 institutions: 6 from state and 6 from federal institutions whereas all of them were government funded institutions. At the second stage, purposive sampling technique was used for selecting 2 academic libraries from each type of institution.

Table 2: Breakdown of the Population and the Number of Institutions that participated in the Study

Frequency Table of Names of Institutions that Participated in the Study and their Populations

S/N	Names of Institutions	Frequency Population	Percent Population	Cumulative Percent
1.	Enugu State University of Technology, Enugu	24	8.7	8.7
2.	Ebonyi State University, Abakaliki	32	11.6	20.2
3.	Institute of Management and Technology, Enugu	18	6.5	26.7
4.	University of Nigeria, Nsukka	62	22.4	49.1
5.	Federal University of Technology, Owerri	43	15.5	64.6
6.	Abia State Polytechnic, Aba	12	4.3	69.0
7.	AlvanIkoku College of Education, Owerri	15	5.4	74.4
8.	NwaforOrizu College of Education, Nsugbe	17	6.1	80.5
9.	Ebonyi State College of Education, Ikwo	13	4.7	85.2
10.	EhaAmufi College of Education, Eha –Amufu	13	4.7	89.9
11.	AkanuIbiam Federal Polytechnic, Uwana-Afikpo	13	4.7	94.6
12.	Federal Polytechnic, Nekede	15	5.4	100.0
	Total	277	100.0	

Table two above shows that 12 institutions participated in the study while 277 library staff from the above academic institutions participated in the study making it a percentage rate of 100%. These institutions have existed for years and have generated many archival resources and they are also funded by the government.

Table 3: The Background Information of the Respondents

Table 3(A): The Gender of Respondents

S/N	Gender	Frequency	Percent	Cumulative Percent
1.	Male	118	42.6	42.6
2.	Female	159	57.4	100.0
3.	Total	277	100.0	

Table 3A above displays the gender of the respondents. The number of males is 118 (42.6%) while the number of female respondents is 159 (57.4%). This shows that the workforce is generally dominated by females in respect of archival maintenance practices for born digital archival resources.

Table 3 (B): The Working Experience of Respondents

S/N	Work Experience	Frequency	Percent	Cumulative Percent
1.	0 - 5 years	52	18.8	18.8
2.	6 - 10 years	104	37.5	56.3
3.	11 - 15 years	63	22.7	79.1
4.	16 - 20 years	21	7.6	86.6
5.	21 years and above	37	13.4	100.0
	Total	277	100.0	

Table 3B shows the respondents working experiences. It further reveals that 52(18.8%) respondents have worked for 0-5years, 104 (37.5%) have worked for 6-10years, 63 (22.7%) have worked for 11-15years, 21(7.6%) have worked for 16-20 years while 37(13.4%) have 21years and above. This shows that the majority of the respondents (Library staff) have worked for 6-10years which means that they should good working experiences in handling library born-digital archival resources.

Table 3(C): The Qualification of Respondents

S/N	Qualifications	Frequency	Percent	Valid Percent	Cumulative Percent
1.	NCE	10	3.6	3.6	3.6
2.	OND	33	11.9	11.9	15.5
3.	HND	39	14.1	14.1	29.6
4.	B.A	67	24.2	24.2	53.8
5.	BLIS	40	14.4	14.4	68.2
6.	BED	8	2.9	2.9	71.1
7.	MA	5	1.8	1.8	72.9
8.	MLS	51	18.4	18.4	91.3
9.	Ph.D	24	8.7	8.7	100.0
	Total	277	100.0	100.0	

Table 3C exposes the qualifications of the respondents. It further reveals that 10(3.6%) of them are NCE holders, 33(11.9%) are OND holders, 39(14.1%) are HND holders, 67(24.2%) are B.A holders, 40 (14.4%) are BLIS holders, 8 (2.9) have BED, 5(1.8%) possess MA, 51(18.4) are MLS holders while 24(8.7%) possess Ph.D. This reveals that the majorities of the library staff are university graduates and should be knowledgeable in maintaining born-digital archival resources.

Research Question 1: What are the types of born digital archival resources available in academic libraries in Nigeria?

Table 4: ***Percentage Response of Respondents on Availability of Archival Born Digital Resources in Academic Libraries in South East, Nigeria***

S/N	Kinds of Information Resources	Available		Not Available	
	Born Digital Archival Resources	F	%	F	%
1	Compact Disks	6	50.0	6	50.0
2	Electronic texts	5	41.7	7	58.3
3	Bibliographic databases	7	58.3	5	41.7
4	Websites	5	41.7	7	58.3
5	Electronic books	7	58.3	5	41.7
6	Digital photographs	6	50.0	6	50.0
7	Software applications	7	58.3	5	41.7
8	Organizational records e.g. soft copies associations records.	5	41.7	7	58.3
9	Research data from academic institution	4	33.3	8	66.7
10	Online learning and training resources	4	33.3	8	66.7
11	Portable Document Folders (PDF's)	5	41.7	7	58.3
12	Web documents/contents	5	41.7	7	58.3
13	Institutional repositories	7	58.3	5	41.7

Table 4 above shows the archival resources available in the 12 academic libraries studied in South East, Nigeria. It further exposes their percentages of availability. Compact disks (50.0%), electronic texts (41.7%), bibliographic databases (58.3%), websites (41.7%), electronic books (58.3%)digital photographs (50.0%), software applications (58.3%), organizational records (41.7%), research data from academic institution (33.3%), online learning and training resources (33.3%), Portable document Formats (41.7%), web document/contents (41.7%) and institutional repositories (58.3%). These findings indicate that the most available born-digital archival resources in the institutions are bibliographic databases, electronic books, software applications, and institutional repositories. In contrast, research data from academic institutions and online learning and training resources are the least available resources, with the lowest percentages.

The availability of born-digital archival information resources such as bibliographic databases, electronic books, software applications, institutional repositories, digital photographs, and compact disks aligns with the earlier findings of Reitz (as cited in Chimah and Nwokocha,

2015) and Kulhavy et al. (2017). These researchers noted that academic libraries typically have archival resources including CD-ROM drives, institutional repositories, bibliographic databases, electronic texts and books, digital photographs, software applications, published documents, and ancillary materials useful for research and future data interpretation.

Research Question 2: What is the extent of adoption of archival maintenance practices for born digital archival resources in academic libraries in South East, Nigeria?

Table 5: The Mean Ratings and Standard Deviations of Respondents on the Extents of Adoption of Archival Maintenance Practices for Born Digital Archival Resources in Academic Libraries in South East, Nigeria

Adoption of Archival Maintenance Practices for Born Digital Archival Resources in Academic Libraries	Universities $\overline{X}$	Colleges of Edu. $\overline{X}$	Polytechnics $\overline{X}$	Total $\overline{X}$	Decision
Technology preservation e.g. replicating old configuration	3.06	2.31	2.55	2.80	Agree
Data refreshing e.g. periodic copying of digital resources from one physical medium to another	3.03	2.28	2.52	2.77	Agree
Data emulation e.g. creating new digital environment for the digital object.	3.04	2.21	2.47	2.74	Agree
Data migration e.g. conversion of Microsoft word to Portable Document Format (PDF)	3.08	2.52	2.57	2.86	Agree
CD ROM's for archival digital maintenance	3.28	2.55	2.67	3.00	Agree
Hard disks for archival digital maintenance	3.20	2.47	2.64	2.93	Agree
Magnetic tapes for archival digital maintenance	3.13	2.33	2.60	2.85	Agree
Floppy disks for archival digital maintenance	3.13	2.31	2.57	2.84	Agree
Universal Serial Bus (USB) for archival digital maintenance	3.08	2.36	2.64	2.84	Agree

Table 5 reveals mean ratings of respondents on the extents of adoption of archival maintenance practices for born digital archival resources in academic libraries in South East, Nigeria. The results show the different levels of agreement on the adoption of archival maintenance practices with the following means scores according to the highest mean scores: CD Rom's for archival digital maintenance (3.00), hard disks for archival digital maintenance (2.93), data migration e.g. conversion of Microsoft word to Portable Document Format (PDF) (2.86), magnetic tapes for archival digital maintenance (2.85), floppy disks for archival digital maintenance (2.84), Universal Serial

Bus (USB) for archival digital maintenance (2.84), technology preservation e.g. replicating old configuration (2.80), data refreshing e.g. periodic copying of digital resources from one physical medium to another (2.77), and data emulation e.g. creating new digital environment for the digital object (2.74). It further reveals that all the variables tested were practiced at universities and colleges of education.

However, none of them is practiced in polytechnics except data migration e.g. conversion of Microsoft word to Portable Document Format (PDF) and storing born-digital archival resources in CD ROM's. This shows that the Library members of staff in polytechnics are conversant with only two maintenance practices for their born-digital archival resources. They do that alongside with other academic institutions studied. Bagley (2017) and Thomas (2006) note that migration is performed periodically as technology platforms advance and change, transferring the contents of born-digital archival resources from one format to another. The commonest archival maintenance practices for born-digital archival resources are use of CD ROM's, hard disks, data migration, magnetic tapes, floppy disks and USB flash drives in the academic libraries studied. All of them can store data effectively. The CD ROM can store archival born-digital information but it cannot be erased or reused. It has been recorded that it can store up to 600megabytes of data. However, it does not hold information any time it is filled up. For larger archival data storages, software and multimedia applications, CD ROMs can be used. On the one hand, the flash drive is portable and operates faster than others and has a larger storage capacity. This is in line with the findings of Ezeani (2010) who finds out that they are the commonly used storage devices in every type of library.

In addition, Rawat and Parmer (2021) reveal that documents can be acquired electronically or stored in CD/DVD's or online platforms. Technology preservation received positive response as a maintenance practice for born-digital archival resources for effective service delivery in the academic libraries. This is in line with the earlier study carried out by (Sawant, 2014) that technology preservation is a maintenance practice which aims at replicating old hardware and software configurations. Data refreshing is essential for maintaining born-digital archival resources in academic libraries. This finding aligns with the study by Azim et al. (2018), which highlights the importance of data refreshing for upgrading, better storage, and physical transfer of born-digital archival resources to ensure accessibility. Data emulation is also practiced in the academic libraries studied. According to Day (2006), data emulation ensures the authenticity of data by preserving born-digital archival resources in their original forms without alteration. These findings by different scholar's buttress the findings of the present day study and show that maintenance practices aim at prolong the lifespan of born-digital archival materials for posterity and easier accessibility.

Conclusion

The born-digital archival resources in various forms are available in academic libraries and can be made usable and accessible for researchers and posterity when properly maintained by library staff. Maintaining born-digital archival resources can be achieved through technology preservation, data refreshing, data migration, and emulation, using storage devices like hard disk drives, CD-ROMs/DVDs, and online platforms for less sensitive materials. However, the study reveals that the most common maintenance practices in developing countries like Nigeria are using hard disk drives and CD-ROMs/DVDs, indicating the impact of underdevelopment on born-digital archival maintenance. Although technology

preservation, data refreshing, migration, and emulation are adopted, they are not as prevalent as using hard disk drives. The library members of staff in universities are more versed in archival maintenance practices for born-digital resources, followed by those in colleges of education. However, the library staff in the polytechnics of the academic libraries studied need to scale up their maintenance skills with regards to archival maintenance practices for born-digital resources for effective service delivery in academic libraries.

Effective service delivery aims at achieving maximum efficiency and responsiveness in terms of the vision and mission of libraries in academic institutions. Therefore, proper maintenance of born-digital archival resources enhances electronic access of the resources. It also prolongs the lifespan of born-digital archival resources thereby contributing positively to effective service delivery in academic libraries as well as promoting them.

Recommendations

Based on the findings of the study that showed that the use of CD ROM's is the commonest used born-digital archival maintenance practice adopted in the developing countries, the study recommended that:

1. Developing countries should initiate and integrate other preservation programmes for maintaining archival resources, similar to those in developed countries.
2. Training of Library staff is pertinent especially in polytechnics for them to learn and adopt current trends and innovations in maintenance practices for born-digital archival resources.
3. Workshops, conferences, online and in-house training exercises anchored by archivists are highly recommended for library staff for them to be more professional in their jobs especially in this digitally driven world.
4. Library staff should be encouraged to keep acquiring born-digital archival resources in their parent institutions and maintaining them for electronic accessibility of archival resources.
5. Sensitive born-digital archival materials should be stored and retrieved locally, rather than relying on cloud storage or institutional repositories.

These recommendations aim at enhancing the maintenance practices of born-digital archival resources for effective service delivery in academic libraries, particularly in developing countries.

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