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Digital Preservation of Electronic Theses and Dissertations in Public University Libraries in South-East Nigeria

Jerry E. Friday
Federal University Otuoke, fridayjerry65@gmail.com

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Jerry Eyerinmene Friday

University Library, Federal University Otuoke, Bayelsa State, Nigeria

Tel: +2348169381911

fridayjerry65@gmail.com

&

Monica Eberechukwu Eze,

Department of Library and Information Science, Enugu State University of Science and

Technology, Enugu State, Nigeria

Tel: +2348068586823

ezemonica33@ahoo.com

Abstract

The study examined digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria. The study adopted descriptive survey research design. The study population comprised 256 librarians out of which only 68 digital or institutional repository librarians were covered. A self-constructed questionnaire was used for data collection. Data were analysed using mean and standard deviation. It was found that information migration was the most common strategy adopted for preserving e-theses and dissertations in the university libraries. It was also discovered that the libraries mostly used DSpace for preserving e-theses and dissertations. Moreso, their most common policies for preserving e-theses and dissertations relate to ensuring long-term accessibility, maintenance of continued authenticity and integrity of items, allocating responsibility to skilled and administrative staff, allowing open access and permitting items to be deposited by author for self-archiving. The research also identified lack of adequate funding, adequate ICT facilities, skilled staff, poor power supply, lack of staff development programmes and policy as the top challenges facing the libraries in preserving e-theses and dissertations. The study recommended that government should provide adequate funding to public universities, universities management should conduct personnel development programmes for librarians and improve power supply.

Keywords: University libraries, digital preservation, electronic theses, electronic dissertations, Nigeria

Introduction

A university library provides information resources and services to enable a university achieve its teaching, learning and research objectives. University libraries have been conceived as libraries set up with the major aim of helping universities to carry out their academic activities which are in line with and promote their vision (Ishola, 2014). In recent times, electronic theses and dissertations have become an essential part of the information resources university libraries provide to support research in universities. In the context of this research, electronic theses and dissertations refer to online versions of postgraduate students' research output. Khaparde and Ambedkar (2014) see electronic theses and dissertations as master's theses or doctoral dissertations that are archived and distributed in an electronic form instead of being archived and distributed in print format. Electronic theses and dissertations have also been described as electronic forms of theses and dissertations that contain the research results of postgraduate students, including such parts as literature review, methodology, analysis, discussion and conclusion. They have been categorized into two types: digitized forms which are conversions of print forms of theses and dissertations into electronic formats and the born-digital forms which are originally created in electronic forms and then submitted by students electronically (Park & Richard, 2011). A good number of electronic theses and dissertations are in the form of text uploaded in a word processing format, in an Adobe portable document format (PDF), in HTML, XML and include color images, streaming multimedia, animation, and interactive features. Their storage platforms could be CD-ROM or the World Wide Web. These electronic information resources can be can be viewed with the free ADOBE ACROBAT READER and can be searched with licensed Adobe Acrobat software (a different version than the Reader) (Khaparde and Ambedkar, 2014). In whatever type or form electronic theses and dissertations may appear, they hold a lot of promise.

The importance of electronic theses and dissertations can be better appreciated in a learning atmosphere. The benefits of theses and dissertations have been identified to include boosting the ranking of universities, increasing their visibility, enabling students save their research costs, helping university libraries to save storage space, helping universities to keep theses and dissertations for future generation of information users, making such resources widely available, enabling other information users to connect to these resources, enabling students to disseminate a quality research work, promoting postgraduate studies, paving the way for the adoption of digital libraries, helping people to have a better knowledge of publication activities, reducing the submission and handling prices of theses and dissertations, enabling universities to show the contents of their information resources to the world as well as promoting the tools of electronic libraries (Bandra, 2002; Baro, Godfrey and Eze, 2014). These benefits of electronic theses and dissertations must have driven Nigerian university libraries to digitise their print theses and dissertations, a process which, according to Baro et al (2014), began in 1985. However, students, researchers and lecturers in universities could be denied of these benefits of electronic theses and dissertations because of the nature of such information resources. Sambo, Urhefe and Ejitagha (2017) stated that electronic documents prone to loss and harm not only because the condition of their storage devices get worse quickly but also because such storage devices could stop working unexpectedly when they are used on defective reading and writing devices. Nworie (2019) stated that the information contained in electronic information resources is likely to be lost and the medium, materials and resources used in producing and collecting them are very sensitive, exquisite and frail. Nworie added that this characteristic makes it necessary for such information

resources to be treated in a way that will make them stand the test of time. Moreso, even the technology which is used for the management of such resources tends to be outdated with time and such changes in technology also affect them. Thus, Okoh and Sambo (2014) stated that digital information items which are not safeguarded against the threat of changes in information and communication technology may not be found when they are looked for in the future. This has given rise to the need for university libraries around the world to take measures to ensure that electronic information resources in their collection have a long life. Such measures have been coined as "digital preservation".

The concept of digital preservation is a new development in librarianship. It has been observed that digital preservation is a recent phenomenon which came into being with other trends in librarianship such as electronic libraries and digital curation and it first emerged as a means of facilitating preservation of digital information resources in traditional libraries (Beagrie, 2006; Chowdhury, 2010). Digital preservation could be simply defined as the process of treating electronic information resources with a view to giving them a long life. It could also be described as steps taken to invest electronic information resources with enduring value. The term 'digital preservation' has been defined as the planning, resources allocation and application of preservation methods and technologies necessary to ensure that digital information of continuing value remains accessible and usable (Saminu, 2016). Saminu also added that digital preservation is the work needed to ensure that digital content is maintained and accessible for future use. Digital preservation has also been defined as the combination of policies, strategies and actions to ensure access to and accurate rendering of authenticated reformatted and born-digital content over time regardless of the challenges of media failure and technological change (Noonan, 2014). Digital preservation has also been described as a combination of policies, strategies and actions to ensure that digital objects remain authentic and accessible to users and systems over a long period of time, regardless of the challenges of component and management failures (American Library Association, 2018). Digital preservation involves the preservation of two categories of information resources which are the born-digital types which are originally made in an electronic form and digital surrogate which were originally produced in print format and later given an electronic version (Noonan, 2014). Digital preservation has also been defined as ways of managing the risks of loss of information as well as guaranteeing that electronic information stand the test of time and have meaningful access (Matlala, 2019). In whatever way digital preservation is defined, the rationale behind it is to ensure the electronic information resources can be located and used by information users in the near and distant future. Zarnits and Arning (2019) observed that all electronic collections require digital preservation because their formats, software, hardware and storage devices are subject to constant changes and obsolescence. Thus, Zarnits and Arning noted that digital preservation is intended to maintain the usability of electronic information resources over time. Kalusopa (2018) stated that the reason for digital preservation is to ensure that electronic collections can be displayed, retrieved and used continuously regardless of constant modifications in technology and organizational infrastructures and elements. Thus, digital preservation is crucial in this digital age.

Digital preservation finds relevance in the fact that the information seeking behavior of postgraduate students currently gravitate towards electronic information resources. Zarnits and Arning (2019) stated that digital preservation is increasingly vital because researchers and students heavily depend on electronic resources and their continued supply. In view of its

importance, Baucom, Troup, Cote and Mannheimer (2018) also observed that the absence of digital preservation not only denies a user of the ability to access electronic information resources but also of the capacity to evaluate both the authenticity and trustworthiness of such an information resource even if it survives into the future. Thus, Gladney (2009) emphasized the relevance of information to be properly stored for the future, and of the ability of information users to lay hold of information in the future, to be sure that the information is correct in the future and to be able to satisfy their information needs as they like in the future.

University libraries in Nigeria have been making provisions for these future information users in the electronic environment through digital preservation and more and more universities libraries are adopting this method of information management. As regards South-East Nigeria, Saminu (2016) hinted that the Nnamdi Azikiwe University Library and University of Nigeria, Nsukka Library have been engaged in digital preservation, with the former at the forefront. However, Ezema and Ugwu (2013), among other things, stated that preservation of e-theses and dissertations in Africa is not living up to expectations, even in spite of the potentials information and communication technology offers for preserving those resources.

Statement of the problem
In the current digital age, university libraries are not only obliged to provide electronic information resources, including electronic theses and dissertations, but also to ensure that the contents of such resources are kept safe for future generation of information users. This is in view of enabling such libraries fully support the cause of teaching, learning and research and maintaining their relevance in the digital age.

However, preliminary survey reveals that students and researchers in university libraries in South-East Nigeria often complain of non-availability and non-accessibility of previous electronic postgraduate research works. This has stifled postgraduate studies and research in these universities. Similarly, it has diminished the visibility of these universities and militated against the teaching, learning and research objectives of these universities.
It was against this background that this study examined digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria.

Purpose of the Study
The study had the general objective of examining digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria. Specifically, the study:

1. Determined the strategies used for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
2. Evaluated the software adopted for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
3. Assessed the policies available for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
4. Found out the challenges confronting digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Research Questions
> This research was guided by the following research questions:
1. What are the strategies used for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
2. What are the software adopted for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
3. What are the policies available for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?
4. What are the challenges confronting digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Review of Related Literature
Strategies Used for Digital Preservation of Electronic Theses and Dissertations in Public University Libraries
Digital preservation strategies could be described as the various approaches to carrying out digital preservation. Samiee and Davallu (2014) defined digital preservation strategies and frameworks as the entirety of the actions needed to sustain access to electronic information resources in a way that such resources will not be affected by technological changes and media failure. Digital preservation strategies have also been viewed as the methods for keeping stored digital objects permanently accessible for long-term re-use. Such strategies are said to be adopted by organizations based primarily on nature of the file and availability of infrastructures (Gbaje and Mohammed, 2017). Digital preservation strategies help to put digital preservation policies into effect. Thus, Dressler (2017) stated that the absence of digital preservation steps and strategies to execute digital preservation will prevent an institution from implementing a meaningful and clever digital preservation policy.

A number of studies have revealed the strategies for digital preservation of electronic theses and dissertations in university libraries. Saka**,** Babalola**,** Ahmed and Mohammed (2010) revealed, among other things, that digitization and library catalogue were the major tools used for preserving research output of academic staff in federal university libraries in Northern Nigeria. Ilo, Idiegbeyan-Ose, Adebayo and Osinulu (2015) discovered, among other things, that only twenty four (24) respondents attested to digitization as a strategy of preserving theses in selected university libraries in Ogun State of Nigeria. Jimada (2015) revealed that migration and use of standard are the popular strategies used for preservation of digital information resources in federal university libraries in North-Western States of Nigeria. According to Abubakar (2016), migration and emulation are the most prevalent digital preservation strategies in academic libraries. Gbaje and Mohammed (2017) revealed that none of the academic institutions studied has put in place any strategy to ensure the long-term re-use or accessibilities of the contents of their institutional repositories. Ukachi (2018) revealed that the two most prevailing activities carried out by the Nigerian libraries in promoting their institutional repositories for enhanced scholarly communication are digitization of scholarly contents in printed format and allowing self-archiving of research outputs of members of staff. Anyaoku, Echedom and Baro (2019) showed that more than half of the African institutional repositories studied adopted information migration. Nworie (2019) reported, among other things, that the current digital preservation strategies in university libraries in South-East Nigeria adopted were almost in line with the UNESCO Digital Preservation Guidelines. Mohammed, Garba and Abdullahi (2019) found,

among other things, that migration, refreshing and normalization were the most common strategies employed for the preservation of electronic information materials in university libraries in North-East Nigeria.

Software Adopted for Digital Preservation of Electronic Theses and Dissertations in Public University Libraries

For the purpose of this paper, digital preservation software is defined as a set of instructions which enable a librarian, an information and communication technology officer or an archivist to preserve electronic theses and dissertations by using an electronic tool such as a computer. A number of softwares are used for digital preservation of electronic theses and dissertations in university libraries and these are evident in the literature on digital preservation. Mohammed (2014) noted that a good number of academic organisations adopt open source software for the preservation of electronic information items, identifying such software to include DSpace, Fedora, Eprints and Greenstone. Anyaoku, Echedom and Baro (2019) reported that the most of the African institutional repositories they surveyed made use of DSpace for preserving their electronic information materials. Wheatley (2004) observed that some of the commonly-used open-source software for preserving digital information resources in institutional repositories are DSpace, EPrint, FEDORA (Flexible Extensible Digital Object Repository Architecture), MyCoRe and so on. Gaining an understanding of these open-source digital preservation software is crucial.

Anyaoku, Echedom and Baro (2019) identified and discussed the following open source software used for digital preservation:

DSpace: DSpace was mainly designed for institutions to store, preserve their institutional materials as well created access to a wide range of those resources. The software was generated by Massachusetts Institute of Technology (MIT) and Hewlett-Packard for the purpose of fulfilling the preservation and information dissemination needs of the user. It was also meant to satisfy the demands of a flexible institutional repository. The software is written in JAVA and employs a PostgreSQL database layer. It was also intended to help institutions achieve long-term preservation of their information resources.

EPrint: EPrint was principally designed to store and disseminate information resources and to provide flexibility for a variety of information items. The software was designed by the University of Southampton to enhance open access to scholarly resources. It is written in PERL and makes use of a MYSQL database layer. It was not aimed at assisting institutions to achieve long-term preservation of their information materials.

FEDORA: FEDORA, whose full name is Flexible and Extensible Digital Object and Repository Architecture, was designed by Cornell University and the University of Virginia to enable institutions build institutional repositories and digital libraries. FEDORA was basically developed to help institutions store and preserve information resources as well as support flexibility for such institutions to make varied uses of the software. The software is written in JAVA and it depends on a broad spectrum of developing standards such as SOAP and METS. It was not intended to enable institutions accomplish long-term preservation goals.

MyCoRe: MyCoRe, whose full name is My Document Repository, just like FEDORA, was basically designed for the purpose of enabling institutions store and disseminate information resources as well as support such institutions to put it to a multiplicity of uses. The software was designed to help institutions create institutional repositories. It was designed by a team of

collaborating German universities. The software is written in JAVA and has a flexible database layer that enables it to be adopted with a variety of database back-ends. The software was not aimed at enabling institutions achieve long-term preservation goals.

Policies Available for digital Preservation of Electronic Theses and Dissertations in Public University Libraries

A digital preservation policy could be described as the dos and don'ts of digital preservation. It is, therefore, a useful roadmap which provides direction for digital preservation. Thus, Noonan (2014) stated that the purpose of a standard policy for preservation of electronic information items is to coordinate and give the go-ahead for digital preservation activities and to guarantee the dependability, permanent access and originality of such information resources. Similarly, Electronic Resource Preservation and Access Network (2003) stated that the main purpose of a digital preservation policy is to preserve and provide continued access to digital materials, both born-digital and digitised materials, ensure that preserved digital materials are authentic and prevent damage and deterioration of the physical media by ensuring an environmental control. In view of its relevance, Anyaoku, Echedom and Baro (2019) emphasized the necessity of deciding on and enforcing a unified plan for carrying out digital preservation which specifies who should be responsible for the process, what should be preserved and the duration for which they should be preserved. This indicates that a digital preservation policy is made up of a number of elements.

In 2012, a joint effort was made by the staff of institutional repositories of The Ohio State University Libraries (OSULs), Special Collections and Archives Unit and that of Information and Communication technology Unit with a view to developing a model for preserving electronic information resources (Noonan, 2014). Noonan noted that the team came up with the following elements of a sound digital preservation policy:

_ Introduction or purpose: a contextualization and articulation of the need for the policy.
_ Mandate: a statement that addresses legal, institutional, and/or unit requirements to preserve digital objects.
_ Objectives: a description of the intentions of an institution's or organization's digital preservation program, possibly tied into the organization's mission statement.
_ Scope: a statement that establishes boundaries as to what the organization will preserve and more often than not establishes priorities among various materials; examples include but are not limited to born digital, digitized with analog original, digitized without analog original, and commercially available digital materials.
_ Challenges: an identification and articulation of the challenges and risks associated with the process of digital preservation.
_ Principles: a statement that addresses the values and philosophy by which an organization operates its digital preservation program.
_ Roles and responsibilities: an identification of the various roles in the digital preservation process; it may aggregate the roles at an institutional or unit within an institution level, establish group roles, or identify individual roles.
_ Collaboration: a statement that acknowledges that digital preservation is a shared community responsibility and identifies steps to be taken to cooperate and collaborate.
_ Selection and acquisition: criteria for materials to be preserved, tied to a repository's collection development policy.

_ Access and use: a statement that addresses the concept of open access as well as levels of restriction; further, it addresses the likely inability to render the original digital artifact and that the effort will be made to deliver the best possible surrogate.

_ References: a listing that identifies other standards and policies referred to within the policy document.

_ Glossary: a listing of terms as necessary.

The above components of a sound digital preservation policy have been translated into concrete digital preservation policies by a number of university libraries outside the African continent. For instance, Banach, Shepherd, Rubinstein, Shelburne, Canavan and Li (2011) revealed that the digital preservation policy of University of Massachusetts Amherst Libraries supports the provision of long-term preservation and accessibility of both digitized and born-digital information resources held in the libraries. The policy also aims to maintain the authenticity and utility of all its resources. The criteria for selection and preservation of digital resources are applied for the selection and preservation of digital resources. The decisions regarding the choice and preservation of digital resources are taken by experts based on the value of the content in consultation with the relevant information technology and preservation experts. Digital preservation decisions are made on the basis of the digital preservation policy, the libraries' three-year plan, the libraries' selection criteria for collecting and storing digital content, the enduring value of the digital resources and the feasibility of preserving the digital resources. The main stakeholders who implement digital preservation include the University of Massachusetts Amherst libraries, the libraries' administration, the libraries' systems department, content creators, digital collection managers, the digital creation and preservation working group and the University of Massachusetts Amherst. In terms of access and use criteria, the libraries provide access to digital materials preserved by the Massachusetts Amherst Libraries. On the other hand, the purpose of the digital preservation policy of the University of Houston Amherst Libraries is to support preservation of the digitized and born-digital resources in its collections and to provide long-term access to these resources. The target audience of the policy includes librarians and staff of University of Houston Amherst Libraries, digital content donors/depositors, funders and users. The mandate of the policy is to obtain the commitment from management to support and provide direction for the development of a comprehensive digital preservation program; promote scholarship, teaching and learning; collect and preserve university or institutional records, including those in electronic format; maintain the authenticity and integrity of archival files through the provisions of federal and state laws such as the State Records Retention Schedule and the Freedom of Information Act and to enter into alliances and contractual agreements with a view to promoting preservation efforts. The libraries take responsibility for retaining and managing the following electronic resources: electronic versions of resources owned and reformatted by UH Libraries and that fall under the parameters of UH Libraries' Digital Collection Development Policy; Unique born-digital resources that are part of UH Libraries' archival/manuscript collections and which are unlikely to be preserved anywhere else; Digitized master files of extremely high-risk audiovisual content, representing as significant financial and institutional investment; any other content acquired or digitized by UH Libraries that falls under the parameters of UH Libraries' Digital Collection Development Policy. Some of the principles of the policy include continual improvement, excellence in collections, partnership and collaboration, and service excellence. These core groups or stakeholders who contribute to the life cycle of records and administer the digital preservation program include UH Libraries as

an institution, members of the UH Libraries' administration, Library Technology Services, Metadata and Digitization Services, Special Collections, Branch Libraries, Digital Research Services, the larger UH Main Campus community, TDL and content producers and donors. UH Libraries aim to collaborate with external partners, including TDL and HathiTrust, to implement the digital preservation policy and to share the larger responsibility of preserving electronic resources for long-term access. In terms of selection and acquisition, the digital preservation policy supports the selection and acquisition of digitised and born-digital resources at UH libraries. As regards access and use, UH Libraries' provide online access to all digital collections in a meaningful format for its patrons through the libraries' website and other dissemination platforms (University of Houston Amherst Libraries, 2018).

While the importance of a clearly-defined digital preservation policy cannot be over-emphasised, a number of university libraries in Africa in general and in Nigeria in particular, are yet to recognize such relevance. For example, Matlala (2019) revealed that there was no defined policy for preserving the electronic information resources in the University of KwaZulu-Natal archives in spite of their acknowledgment that digital preservation had started at the university. This scenario is not different from is obtainable in some Nigerian university libraries. Okoh and Sambo (2014) observed, among other things, that several Nigeria libraries do not have a policy for preserving electronic information items. However, the study of Anyaoku, Echedom and Baro (2019) revealed sketches of digital preservation policies in African institutional repositories. It was also discovered that a better part of the IRs have a digital preservation policy. The researchers grouped the policies into three types: preservation policy that permit enduring accessibility and accessibility, open access, everlasting preservation of digital information resources; content policy which revolves around accommodation of all kinds of digital information resources (working drafts, submitted versions, accepted versions, published versions); selection policy which allows submission of copies of items by authorities institutional staff or their delegates, submission of items by author for purposes of self-archiving, validation of items for purposes of eligibility of author or depository, relevance of scope, structure, format and for the purpose of preventing spam. Other revelations of the study are the submission of items mostly by staff of the institutional repositories, the entering of agreement with authors of digital information items. The researchers also revealed most of the electronic information materials are deposited by repository staff, which is mainly through "online click-through agreement for mainly copyright" and sometimes by "written agreements". Similarly, Masenya and Ngulube (2020) observed that a digital preservation policy includes policies that permit free access and use of digital information items, metadata policy, policy for converting information items into electronic format and for preserving them in an electronic way, policies that specify the ways of developing and managing the information contained in such resources, policies for storing and processing them, policy that allow the preservation of copyrighted digital resources, policy for saving library collections during disaster, policy that permit citations of copyrighted electronic items. Specifically, in terms of responsibility policies, Electronic Resource Preservation and Access Network (2003) identifies the roles of people responsible for the development and implementation of a digital preservation policy to include making decisions of retention, use and preservation of digital materials at the acquisition or creation stage, not later; establishing maintenance procedures and quality control within monitoring processes and programmes; establishing and implementing strategies for digital preservation; developing a disaster recovery programme and ensuring security of access to digital materials.

Challenges Confronting Digital Preservation of Electronic Theses and Dissertations in Public University Libraries

A number of studies have established the fact that preservation of electronic theses and dissertations in university libraries is not free of obstacles. Ezeani and Ezema (2009) reported that librarians at the University of Nigeria, Nsukka, who carry out digital preservation lack the entirety of skills needed to perform the task and such skills mainly revolve around trouble-shooting, book marking and characterization of scanned documents. Okoh and Sambo (2014) identified digital preservation challenges in Nigeria to include lack of adequate funding, standard policies, management support and poor human capital development. Ilo, Idiegbeyan-Ose, Adebayo and Osinulu (2015), among other things, discovered that the major problems hindering effective theses and projects management in selected university libraries in Ogun State of Nigeria included absence of funding, competent staff and storage facilities, among others. Jimada (2015) identified the core digital preservation challenges in federal university libraries in North-Western States of Nigeria to include absence of Information and Communication technology and sufficient funding, poor attitude to maintenance of ICT and insufficient electricity supply. Gbaje and Mohammed (2017) found that back-up of institutional repository is not enough to guarantee the long-term accessibility and re-use of the contents in some selected Nigerian academic institutions. Sambo, Urhefe and Ejitagha (2017) revealed, among other findings, that the major challenges facing digital preservation in Nigerian libraries included lack of digital preservation policy, training, funding, backup and standards, strategy policy, legal backing to preserve digital information resources, obsolescence of hardware and software and unserious dispositions of the librarians. Atanda (2017) discovered that the main barrier to digital preservation in Nigerian libraries is absence of stable digital preservation strategies. University of Houston Amherst Libraries (2018) reveals that they are faced by the following challenges in her bid to preserve her electronic information resources: insufficient organizational and technical infrastructures, trouble in maintaining understandable, reliable and authentic digital materials and ensuring their accessibility over the long term, wide variety of variables which exist during the digital preservation process including mixed levels of complexity in terms of object structure, relationships and dependencies, mixed levels of intellectual control, different levels of complexity in preservation planning and processing, different timetables for preservation action and the need of different preservation approaches, often at different scales, explosion of digital materials of all types being produced, the need to migrate digital assets as systems change over time and lack of well-established standards o aid preservation of digital materials. Anyaoku, Echedom and Baro (2019) noted that digital preservation in African institutional repositories is hampered by lack of concrete policies, feasible standards and strategies for preserving electronic information resources, long-term financial provision and incompetence of digital preservation personnel. Nworie (2019) revealed that the librarians in the university libraries in South-East Nigeria appeared to possess no knowledge of the UNESCO's Digital Preservation Guidelines. Masenya and Ngulube (2020) revealed that libraries in South African tertiary institutions encountered hindrances in the preservation and maintenance of their electronic information materials due to lack of insufficient resources, defined procedures, standards and policies, collaboration, out-datedness of ICT, legal bottlenecks, paucity of ICT, competent staff, inadequate funding and absence of human development programs.

Method

The study adopted descriptive survey research design. The study was carried out in South-East Nigeria. The study covered the ten (10) public university libraries in South-East Nigeria. The population of the study comprised all the two hundred and fifty six (256) librarians working in the ten (10) public university libraries in South-East Nigeria. The study, however, covered only the 68 librarians working in the institutional repositories/digital libraries in these university libraries. This choice was to guarantee objectivity and dependability of responses. The instrument for data collection was a self-constructed questionnaire. The instrument was titled "Digital Preservation of Electronic Theses and Dissertations Questionnaire (DPETDQ)". The questionnaire consisted of two sections. Section A and B. Section A elicited information on the background of the respondents while Section B had four (4) clusters with cluster A dealing with Strategies for Digital Preservation of Electronic Theses and Dissertation, Cluster B with Software Adopted for Digital Preservation of Electronic Theses and Dissertation, Cluster C with Policies Available for Digital Preservation of Electronic Theses and Dissertation and Cluster D with Challenges in Digital Preservation of Electronic Theses and Dissertations. The instrument was validated by two experts in the Department of Library and Information Science and one expert in Measurement and Evaluation, all in Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. Reliability test was not conducted on the instrument based on the position of Nworgu (2015) that once a test is valid, it tends to be reliable. The researcher visited the university libraries and administered sixty eight (68) copies of the draft of the validated questionnaire to the respondents with the help of research assistants. The researcher collected the questionnaires completed on the spot while the rest were retrieved from the research assistants upon completion. All the administered questionnaires were properly filled in and eventually collected, yielding a response rate of 100%. The data collected were analyzed using descriptive statistics of simple percentage.

Results

Research Question 1: What are the strategies used for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Table 1: Analysis of Responses on the Strategies Adopted for Digital Preservation of E-Theses and Dissertations in Public University Libraries in South-East Nigeria.

S/N	Strategies	No. & % of Adopted Responses	No. & % of Unadopted Responses
1.	Technology Preservation	15 (22.06%)	53 (77.94%)
2.	Technology Emulation	43 (63.24%)	25 (36.76%)
3.	Information Migration	50 (73.53%)	18 (26. 47%)
5.	Encapsulation	31 (45.59%)	37 (54.41%)
6.	Refreshing or copying	35 (51.47%)	33 (48.53%)

Table 1 demonstrated that information migration was the most common strategy adopted for digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria.

Research Question 2: What are the software adopted for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Table 2: Analysis of Responses on the Types of Software Adopted for Digital Preservation of E-Theses and Dissertations in Public University Libraries in South-East Nigeria

S/N	Software	No. & % of Adopted Responses	No. & % of Unadopted Responses
1.	DSpace	62 (91.18%)	6 (8.82%)
2.	FEDORA	11 (16.18%)	57 (83.82%)
3.	MYCoRE	0 (0%)	68 (100%)
4.	EPrints	43 (63.24%)	25 (36.76%)
5.	Greenstone	45 (66.18%)	23 (33.82%)
6.	Any others, please specify		

Table 2 shows that DSpace is the most popular software used for digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria. However, respondents did not give any reply to "Any others, please specify."

Research Question 3: What are the policies available for digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Table 3: **Analysis of Responses on the Policies Available for Digital Preservation of E-Theses and Dissertations in Public University Libraries in South-East Nigeria**

S/N	Policies	No. & % of Available Responses	No. & % of Unavailable Responses
1.	Maintain continued authenticity and integrity of items	58(85.29%)	10(14.71%)
2.	Ensure open access	49(72.06%)	19(27.94%)
3.	Items restricted to staff and students	17 (25%)	51(75%)
4.	Items to be deposited by author for self-archiving	47(69. 2%)	21 (30.8%)
5.	Items to be deposited by third party on behalf of author	10(14.71%)	58(85.29%)
6.	Items to be deposited by repository staff	25(36.76%)	43(63.24%)
7.	Entering copyright agreement with author	41(60.29%)	19(27.94%)
8.	Ensuring long-term funding for sustainable digital preservation	10(14.71%)	58(85.29%)
9.	Ensure long-term accessibility of items	68 (100%)	0 (0%)
10.	Allocating responsibility to technical and administrative staff	53(77.94%)	17(22.06%)
11.	Any others, please specify		

Table 3 indicates that ensuring long-term accessibility of items, maintenance of continued authenticity and integrity of items, allocating responsibility to skilled and administrative staff and allowing open access and permitting items to be deposited by author for self-archiving are the most common digital preservation policies adopted for digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria. However, respondents did not provide any answer to "Any others, please specify."

Research Question 4: What are the challenges confronting digital preservation of electronic theses and dissertations in public university libraries in South-East Nigeria?

Table 4: **Analysis of Responses on Challenges Encountered in Digital Preservation of E-Theses and Dissertations in Public University Libraries in South-East Nigeria**

S/N	Challenges	No. & % of Agreed Responses	No. & % of Disagreed Responses
1.	Lack of skilled staff	54 (79.41%)	14 (20.59%)
2.	Lack of adequate ICT facilities	55 (80.88%)	49 (72.06%)
3.	Lack of adequate funding	58 (85.29%)	10 (14.71%)
4.	Lack of commitment from staff or management	40 (58.82%)	28 (41.18%)
5.	Absence of digital preservation policy	50 (73.53%)	18 (26.47%)
6.	Lack of continuing education	43 (63.24%)	25 (36.76%)
7.	Poor power supply	54 (79.41%)	14 (20.59%)
8.	Legal challenges such as copyright issues	37 (54.41%)	31 (45.59%)
9.	Lack of staff development programmes	53 (77.94%)	15 (22.06%)
10.	Poor internet connectivity	45 (66.18%)	23 (33.82%)
11.	Technological obsolescence	35 (51.47%)	33 (48.53%)
12.	Any others, please specify		

Table 4 shows that the major challenges facing digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria are lack of adequate funding, lack of adequate ICT facilities, lack of skilled staff , poor power supply, lack of staff development programmes and absence of a digital preservation policy. However, there was no response to "Any others, please specify."

Discussion of Results
The study demonstrated that information migration was the most common strategy adopted for digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria. The outcome is in line with the result of the study by Jimada (2015) that migration is one of the popular strategies used for preservation of digital information resources in federal university libraries in North-Western States of Nigeria. The result also affirms the assertion of Abubakar (2016) that migration and emulation are the two most common enduring digital preservation strategies in academic libraries. However, emulation was not as same prevalent as migration in the present study. The result also corresponds with the finding of the study by Mohammed, Garba and Abdullahi (2019) that migration is one of the most common strategies employed for the preservation of electronic information materials in university libraries in North-East Nigeria. The finding also agrees with the offshoot of the research by Anyaoku, Echedom and Baro (2019) that more than half of African institutional repositories surveyed carried out information migration. This result could be as a result of the fact that Nigerian university libraries have the tendency to experiment with strategies which have been found effective in digital preservation in sister university libraries. Information migration has been applied for

digital preservation in university libraries with considerable success and this might have resulted in the craze for these libraries to give it a try and achieve similar result.

The research also displayed that the public university libraries in South-East Nigeria mostly used DSpace software for digital preservation of e-theses and dissertations. The finding lends support to the observation of Mohammed (2014) that a good number of Nigerian academic institutions adopt DSpace, Fedora, Eprints or Greenstone. The result is also in consonance with the outcome of the research by Anyaoku, Echedom and Baro (2019) that a better part of the African institutional repositories studied employed DSpace to execute digital preservation. This finding may be due to the fact that open-source digital preservation software can be easily acquired and are flexible enough to meet the peculiar needs of digital preservation in university libraries.

The investigation also indicated that the most common digital preservation policies for preserving e-theses and dissertations in public university libraries in South-East Nigeria are policies that allow long-term accessibility of items, maintenance of continued authenticity and integrity of items, allocation of responsibility to skilled and administrative staff and permit open access and permit items to be deposited by author for self-archiving. This affirms the finding of the study by Anyaoku, Echedom and Baro (2019) which identified digital preservation policies in African institutional repositories to include, among others, policies that support durable preservation, accessibility, readability and open access and submission of items by author for purposes of self-archiving. The result of the study also confirms the observation of Masenya and Ngulube (2020) that a digital preservation policy includes, among others, policies that permit free access and use of digital information items, policy for converting information items into electronic format and for preserving them in an electronic way, policies for storing and processing them, policy for saving library collections during disaster and policy that permit citations of copyrighted electronic items. The result of this study turned out like this probably because the core objectives of university libraries' is to provide both print and electronic information resources to facilitate teaching, learning and research. Moreso, these libraries provide information resources to meet present and future information needs of lecturers, students and other researchers. As such, these university libraries have formulated digital preservation policies which permit long-term accessibility of items, maintenance of continued authenticity and integrity of items and open access.

Finally, the research identified lack of adequate funding, lack of adequate ICT facilities, skilled staff, poor power supply, staff development programmes and digital preservation policy as the core challenges facing digital preservation of e-theses and dissertations in public university libraries in South-East Nigeria. This result of the study agrees with the fallout of the study by Okoh and Sambo (2014) that digital preservation obstacles included, among others, lack of globally-recognized digital preservation policies, insufficient funding and poor initiatives to develop university libraries and their personnel. The finding also agrees with the result of the research by Jimada (2015) that the core digital preservation challenges in federal university libraries in North-Western States of Nigeria included, among others, absence of Information and Communication technology, lack of sufficient funding and insufficient electricity supply. The outcome of this study is also in agreement with the result of the work by Sambo, Urhefe and Ejitagha (2017) that the major challenges confronting digital preservation included, amidst others, lack of digital preservation policy, obsolescence of hardware and software, lack of

training, lack of funding, lack of backup and standards, lack of strategy policy, unserious dispositions of the librarians and absence of legal backing to preserve digital information resources. On the contrary, respondents did not see technological obsolescence or obsolescence of hardware and software and absence of legal backing as core digital preservation challenges in the current study. It further corroborates the result of the research by Anyaoku, Echedom and Baro (2019) that digital preservation in institutional repositories in Africa is hindered by, among other obstacles, lack of concrete policies, absence of long-term financial provision and incompetence of digital preservation personnel. The study also lends credence to the result of the research by Masenya and Ngulube (2020) that libraries in institutions of higher learning in South Africa encountered hindrances in the preservation and maintenance of their electronic information materials due to insufficient resources, dearth of defined procedures, standards and policies and absence of collaboration, out-datedness of ICT, legal bottlenecks, paucity of ICT, competent staff, inadequate funding and absence of human development programs. However, out-datedness of ICT and legal bottlenecks were not regarded by respondents as major digital preservation challenges in the context of the present research. The finding that technological obsolescence and legal bottlenecks were not perceived as major digital preservation challenges could be a result of the fact that the university libraries mainly adopt open source digital preservation software which are easily accessible and acquired free of charge. Moreso, electronic theses and dissertations in these libraries primarily provide electronic theses and dissertations in their institutional repositories to promote the cause of teaching, learning and research and not for the sake of making profit. Apart from this, depositors of present electronic theses and dissertations had made use of previous e-theses and dissertations and as such, probably see uploading of their e-theses and dissertations into institutional repositories as a norm. Consequently, they may not see any need to take legal action against the university libraries which archive their resources, thus, giving such university libraries free rein in executing digital preservation.

Conclusion
There is no doubt that public university libraries in South-East Nigeria have made significant progress in preservation of e-theses and dissertations generated in them. This progress has been largely achieved through information migration. The libraries have the tendency to adopt open source software in executing such preservation. The software which gained in popularity in this regard is DSpace. Moreover, a good number of these libraries have come up with policies which support permanent access, originality of e-theses and dissertations, unrestricted accees, competence in digital preservation and self-archiving options. As encouraging as the result sounds, the progress in preservation of e-theses and dissertations in the libraries could be impeded by such fundamental challenges as absence of sufficient funding, adequate ICT facilities, skilled staff, poor power supply, staff development programmes and digital preservation policy. .

Recommendations
In view of the findings of the study, it was recommended that:
1. Government should provide adequate funding to universities to support digital preservation initiatives as this will enable their libraries to take care of financial requirements for ICT, personnel development programmes, power generation, etc. This can be done by increasing capital expenditure allocation to universities in annual budgets.

2. Library staff in university libraries should be equipped with technological know-how through staff development programmes;
3. Public university libraries should imbibe the art of engaging their personnel in staff development programmes such as on-the-job-training, preservation seminars and workshops.

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APPENDIX A: Distribution of Librarians Used in the Study

S/N	INSTITUTION	FEDERAL	STATE	INSTITUTIONAL REPOSITORY NO/YES	NO OF LIBRARIANS
1	Michael Okpara University of Agriculture Umudike Abia State	√		√	7
2	Nnamdi Azikiwe Library, University of Nigeria Nsukka Enugu State	√		√	7
3	Festus	√		√	6

	Aghagbo Nwako Library UNIZIK, Awka Anambra State				
4	Chukwuemeka Odumegwu Ojukwu University Library Igbariam Anambra State (COOU)		√	√	5
5	Federal University of Technology Owerri, Imo State (FUTO)	√		√	20
6	Enugu State University of Science and Technology Library (ESUT)		√	. √	5
7	Abia State University Library, Uturu		√	√	9
8	Imo State University Library Owerri		√	√	2
9	Federal University Ndufu Alike, Ikwo Ebonyi State (FUNAI)	√		√	4
10	Ebonyi State University Abakaliki, (EBSU)		√	√	3