Electronic Theses and Dissertations' Development in University Libraries in Nigeria

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ABSTRACT

The study was meant to examine electronic theses and dissertations' development in Nigerian federal university libraries. The study adopted descriptive survey research design. The study population comprised forty-eight institutional repository librarians in eighteen Nigerian federal university libraries. The sample consisted of forty three librarians. A questionnaire was used for data collection. The data collected were analyzed with mean and standard deviation. Findings reveal that the policies available for developing electronic theses and dissertations (ETDs) in the libraries require submission of electronic copies of theses and dissertations by students, participation of digital/IR librarians in ETD development and provision of free access to ETDs; the libraries comply with standards of Open Archives Initiative Protocol for Metadata Harvesting and Search/Retrieval via URL using DSpace for building ETDs and taking advantage of such available ICT facilities as computers, scanners, CD-ROM, LAN, internet connectivity and printer. The libraries achieve ETD through digitisation, mandating submission of electronic versions of TDs by students and creation of IR. However, the process is hindered by technological obsolescence, financial problems, absence of clearly-defined ETD development policy, required ICT facilities and trained staff, copyright, irregular power supply and unstable internet connectivity. This study represents a fresh empirical investigation into electronic theses and dissertations' development in federal university libraries in Nigeria.

1. Introduction

A university can be viewed as the apex level of tertiary educational institution that executes teaching, learning and research. These functions of a university are facilitated by the availability of information which is adequately provided by a university library. The information is provided from a stock of information resources in a university library, which keeps changing through a

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process called collection development. In the context of this study, collection development can be defined as a set of systematic steps taken by the personnel of a university library to renew its stock of print and electronic information resources in response to the teaching, learning and research information needs of students, lecturers and researchers of a university. Collection development has been used to refer to all activities involved in assessing the users' needs, evaluating the present collection, determining the selection policy, coordinating the selection of items, re-evaluating and storing parts of the collection and planning for resource sharing. It is the process by which the strengths and weaknesses in the collection is ascertained on the basis of meaningful data, rather than on subjective choice (Okogwu & Ekere, 2018).

Traditionally, collection development is usually connected with print information resources, which are concrete or tangible information resources which can be held with the hand and read with the naked eyes. This is called print collection development. In the midst of this print collection development process, a number of forces exerted some powerful influence on collection development trend in libraries, particularly university libraries. These forces have been identified to include evolution and proliferation of information technology; growing popularity of internet and overall realization of the utility of electronic technology in every sphere of knowledge; changes in publishing trend in which publishers are inclined towards electronic publishing; information explosion though improving digital technology; financial constraints on the part of all kinds of libraries and tremendous growth of online information products (Babu, 2015). With these forces, libraries are now gradually shifting towards electronic resources collection development to meet the users' needs and demands (Lixin & Thu, 2017). This has brought about a new set of information resources in libraries, including university libraries, called electronic collection. Electronic collection has been described as a collection of information that can be accessed using electronic gadgets or created electronically that form part of an electronic record and that is usually stored separately within the digital file making up the electronic record as a whole (Shukla & Mishra, 2011). With this new brand of information resources, during the last 125 years, library collections have expanded to comprise at least four types, including locally-owned physical documents, physical documents owned by other libraries but available through inter-library loan, purchased or subscribed-to-electronic documents and free electronic documents (Gorman, 2003). Similarly, university library collections have grown to include a set of electronic information resources, which mainly include e-resources which are in a digitized format; scanned images, images of photographic or printed texts, etc; collections in which complete contents of documents are created or converted into machine readable form for online access; online full-text electronic journals, full-text electronic books and other online information products accessible through internet and other networks; computer storage devices such as CD ROM/ DVDS and meta documents (Babu, 2015).

In contemporary times, a core part of digitized electronic information resources in a university library are electronic theses and dissertations. Electronic theses and dissertations can be defined as online or digital versions of the research projects of postgraduate students of universities which are submitted as part of the requirements for certification and graduation. Ezema and Igbo (2016) described electronic theses and dissertations (ETDs) as the electronic digital representation of theses or dissertations, bearing the same content and organization, including the formatting requirements.

They are also viewed as electronic versions of the traditional documents produced in paper or book format as the means of examining and documenting the contributions of a research-oriented degree (Suleman, 2010). The format of a generality of ETDs is characterized by text uploaded in a word processing format or in an Adobe portable document format (PDF) and look much like traditional print dissertations. These documents are readable with the free Adobe Acrobat Reader and searchable with licensed Adobe Acrobat software. Despite the fact that they are uploaded in more sophisticated formats such as HTML and XML and possess color images, streaming multimedia, animation, and interactive features, ETDs may be domiciled on a CD-ROM or the internet where they can be accessed by a wide category of users (Khaparde & Ambedkar, 2014).

Copeland (2008) notes that, while pioneer discussions on the idea of ETDs started in 1987 by University Microfilm International in the United States, ETDs movement was initiated by Ed Fox of Virginia Polytechnic Institute, who is popularly referred to as the father of ETD movements. According to MacColl (2002), this initial movement led to the introduction and development of the Networked Digital Library of Theses and Dissertations (NDLTD) in 1997, which was designed to promote the growth of online theses and dissertations. An institution's membership of NDLTD permits it to mount TDs online on a university server for free Internet access protocol for search retrieval using Z39.50. With this initiative, a growing number of institutions of higher learning and organisations have been encouraging the production and submission of theses and dissertations in electronic format (Copeland, 2008). The university library plays a central role in encouraging ETDs in a university, and some of the factors that contribute to ETD adoption and development in Arab Gulf States' university libraries include the understanding of the gains of ETD programs, awareness of these programs and effective promotion and advocacy (Salmi, 2008). As a result of these factors, a global rise in ETDs in higher educational institutions and allied organizations has been observed. For instance, the decade spanning 2005-2015 witnessed a huge world-wide growth in ETDs in universities and other organizations. While this growth was indicated by an increase in ETDs initiatives and in ETDs collections by 46 and 619.073 respectively, a drastic growth of ETDs and items in open access repositories was witnessed during 2010-2015 and reflected by 2944 and 6.229.261 respectively (Gunjal & Urs, 2010). African universities have also been contributing to this global growth in ETDs.

In Nigeria, significant steps have been taken. A leading role was played by the National Universities Commission (NUC) when it mandated Nigerian academic libraries to provide access to both print information and electronic information resources to serve users and to increase the visibility and image of their institutions (National Universities Commission, 2007). The mandate gave impetus to electronic collection development in Nigerian university libraries. A core aspect of this process involves developing electronic theses and dissertations. Sequel to the NUC's mandate, some Nigerian universities had earlier made some initial efforts to develop electronic theses and dissertations. This effort usually involves digitization of print theses and dissertations generated in Nigerian universities. Digitisation is the conversion of print theses and dissertations into electronic format by scanning and other means. The study by Baro et al. (2014) revealed that this process began between 1980 and 1995 in Nigerian universities. Then, it continued in the 20th century. For example, Hezekiah Oluwasanmi Library, Obafemi Awolowo University, Ile-Ife, started the process in 2003 (Jagboro

et al., 2012), Federal University of Technology Library, Owerri in 2007 (Chukwu et al., 2018), University of Nigeria Library, Nsukka and University of Ilorin Library both in 2008 (Eke-Okpala, 2011; Saliu et al., 2018) and University of Jos Library in 2009 (Akintunde, 2012). In the midst of these efforts, there was also a joint African university initiative to develop ETDs in universities in the African continent.

A major effort made in aggregating African ETDs was the development of the Database of African Theses and Dissertations (DATAD). Kiondo (2004) observed that the African initiative towards the development of ETDs began when the Association of African Universities (AAU) realized that African research results were neither indexed in major databases nor accessible globally. This initiative led to the creation of the Database of African Theses and Dissertations (DATAD) with the intention to expand electronic access to African indigenous knowledge and manage copyright and intellectual property rights of authors. The dream of the initiative came true when African research outputs began to be disseminated online in the year 2000, while the main database was launched on 30th April, 2003. It is known as DATAD Online, with the URL reference: http://www.aau.org/da-tad/database. Ubogu (2006) reported that the database had 14,723 records and was likely to reach 20,000 by the end of 2004. DATAD is a network of ETD collections of individual universities in Africa. The online collection of electronic theses and dissertations of individual universities is usually referred to as an institutional repository. Ubogu (2006) has observed that many African universities have increasingly realized the imperative to establish institutional repositories, with the mandate for graduating students to submit electronic versions of the print copies of their theses and dissertations. Thus, an institutional repository has become a popular platform for making ETDs available globally in Africa. Nigerian universities have also been taken advantage of institutional repositories. Direct investigation and Directory of Open Access Repository (DOAR) indicate that 12% of Nigerian university libraries have functional stand-alone repositories, containing Agriculture ETDs and other digital resources. Out of this figure, 72% of these repositories are owned by federal universities, while 21% and 7% are owned by private and state universities respectively (Salau & Oyedum, 2019). In South-East Nigeria, three federal universities, including University of Nigeria, Nsukka, Nnamibi Azikiwe University, Awka and Federal University of Technology, Owerri, have ETDs (Ezema & Ugwu, 2013).

Despite the ETDs development initiatives in Africa, Cayabyab (2015) observed that ETDs in developed countries have far outgrown those of developing countries. Some peculiar factors could have led to this imbalance. Probably, to unravel these factors and address the imbalance, Cayabyab (2015) maintains that it is necessary to conduct more studies on ETD initiatives in developing countries. This is, perhaps, because more research has been conducted on print library collections than on electronic library collections (Okogwu, 2020). This has left some gaps in knowledge about electronic collection development in libraries. Thus, Swain (2010) observes that a crucial area for more research is the details on how ETD projects are created.

1.1 Statement of the Problem

In the current digital age, university libraries, in an attempt to contribute effectively to teaching,

learning and research in their parent institutions, develop print copies of theses and dissertations into online or electronic versions. This is aimed at giving such information resources global visibility and recognition. Recently, the trend of research in Library and Information Science has shifted to examining issues on electronic information resources and services in academic libraries, one of which is a university library.

Opinion papers (Ezema & Ugwu, 2013) had attempted to propose strategies for the development of electronic theses and dissertations in African university libraries. On the other hand, related empirical studies had only examined the extent and status of adoption of electronic theses and dissertations in Nigerian university libraries (Baro et al., 2014). However, no empirical study, to the best of knowledge of the researchers, had assessed the development of electronic theses and dissertations in university libraries in Nigeria. This created a gap in literature which this research intended to fill. Consequently, this research investigated electronic theses and dissertations' development in university libraries in Nigeria.

1.2 Objectives of the Study

This research had the primary goal of examining electronic theses and dissertations' development in university libraries in Nigeria. Specifically, the study:

1) Identified the policies available for electronic theses and dissertations' development in federal university libraries in Nigeria.
2) Evaluated compliance with standards for electronic theses and dissertations' development in federal university libraries in Nigeria.
3) Assessed the software adopted for electronic theses and dissertations' development in federal university libraries in Nigeria.
4) Identified the facilities available for electronic theses and dissertations' development in federal university libraries in Nigeria.
5) Disclosed the strategies adopted for electronic theses and dissertations' development in federal university libraries in Nigeria.
6) Unraveled the challenges in electronic theses and dissertations' development in federal university libraries in Nigeria.

1.3 Research Questions

The following research questions were formulated to guide this study:

1) What are the policies available for electronic theses and dissertations' development in federal university libraries in Nigeria?
2) Do federal university libraries in Nigeria comply with standards for electronic theses and dissertations' development?
3) Which software are adopted for electronic theses and dissertations' development in federal university libraries in Nigeria?
4) Which ICT facilities are available for electronic theses and dissertations' development in federal

university libraries in Nigeria?

5) What are the strategies adopted for electronic theses and dissertations' development in federal university libraries in Nigeria.
6) What are the challenges in developing electronic theses and dissertations in federal university libraries in Nigeria?

2. Literature Review

2.1 Policies Available for Electronic Theses and Dissertations' Development in Federal University Libraries

Policy is defined as an official authoritative statement of rules, judgments, decisions and guidelines that are used to define, describe, interpret and describe long-range objectives, intentions, functions and procedures; and guide and regulate activities of a group or organization (Patel, 2016). In the context of this study, an electronic theses and dissertations' development policy could be defined as a set of guidelines which spells out the process of developing electronic theses and development. Yiotis (2008) found that library administrators who implement ETD repositories at various universities not only adapt their models to the needs of their institutions and their graduate students but also decide implementation models and software and hardware infrastructure based on the allocation for human and technical resources. These decisions can also be referred to as ETD development policies. According to Ezema and Igbo (2016), these policies revolve around the objectives that the university intends to achieve with the project; the process of submitting the theses and dissertations and addressing copyright matters; the roles of the departments and units that will be involved in the ETDs project, such as the roles and responsibilities of the university library, the post-graduate school, the computer center and the academic departments; how to fund the ETDs program; as well as whether there will be free access to the theses and dissertations or pay-per-view access, which involves providing the public with free access to only the abstracts of the documents. The policy surrounding submission of electronic versions of theses and dissertations could demand that such submission is obligatory or voluntary. In this regard, Copeland (2008) notes that once support has been gained for the establishment of an ETD collection, and decisions made about the material to be added, the university committees will have to decide whether the submission of theses and dissertations in electronic format is to be optional or mandatory. Lippincott and Lynch (2010) surveyed a number of institutions in the USA and found that 87% of these institutions have a policy allowing students to request a limited-time embargo, whereas, 10% have a policy allowing students to request a permanent embargo.

2.2 Standards for Electronic Theses and Dissertations' Development in Federal University Libraries

A standard symbolizes a consensus which dictates the process of executing something so as

to obtain an envisaged outcome (National Information Standards Organization, [NISO], 2002). In the domain of digital library research, standards consist of all protocols and conventions which have been established for digital library architectures, collections, metadata formats, interoperability and so forth (Shiri, n. d.). Protocols define the communication that takes place among two or more parties (Suleman, 2010). Some of the standards which constitute the main areas of digital library research include digital collection development standards; archiving and preservation standards; metadata formats (e.g. Dublin Core, MARC, IMS); cataloguing content and indexing standards and electronic publishing standards for books, journals and other media, OAI and Z39.50 (Shiri, n. d.). A prominent type of a digital collection development standard is electronic theses and dissertations' development standard. In this study, an electronic theses and dissertations' development standard is defined as an internationally-recognised or accepted protocol or convention developed by world international bodies or organizations which should be complied with in developing electronic theses and dissertations. The development of electronic theses and dissertations (ETDs) is usually associated with the establishment of institutional repositories. Thus, similar standards are adopted for both processes. Suleman and Fox (2003) stated that, regardless of the software an institutional repository adopts, all institutional repositories follow standards of interoperability and metadata harvesting established at the 1999 Santa Fe Convention as the open archives initiative, spearheaded by various organizations, including Networked Digital Library of Theses and Dissertations (NDLTD) and the Networked Computer Science Technical Reference Library.

These standards may not be familiar to all Library and Information Science professionals, teachers and readers. As such, the study provides conceptual clarification on these standards to aid understanding of the literature review which is conducted under this subheading.

2.2.1 Interoperability

In the context of digital libraries, interoperability can be viewed as the capacity of two or more digital libraries to have a close working relationship. Similarly, it has been defined as the ability of digital libraries to work in unison so as to render standard services (Suleman, 2002). It is also described as the ability of multiple systems with different hardware and software platforms, data structures, and interfaces to exchange data with minimal loss of content and functionality (National Information Standards Organization, 2004). Interoperability is often defined as the standardisation of either data formats or communications protocols (Suleman, 2010). Two main protocols for interoperability are the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and the Search/Retrieval via URL (SRU) (McCallum, 2006). Described as approaches to interoperability, two of the popular protocols have also been identified as Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and cross-system search. This search is commonly conducted using Z39.50 protocol (Dublin Core Metadata Initiative [DCMI], n. d.).

2.2.2 Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH)

Metadata is structured information that either provides a description or explanation of an information

resource or facilitates its location, retrieval, use or management. It is often called data about data or information about information (National Information Standards Organization, 2004). Metadata harvesting is the process of gathering metadata from separate digital libraries for various purposes such as for developing a central metadata repository (Dodiya, 2016). It is the transfer of collections of metadata from a source system to a target system, which usually ingests the harvested data and indexes it so as to provide services to end users (Suleman, 2010). One of the globally-recognised standards which aid metadata harvesting is the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). OAI-PMH defines a harvesting operation as the means to connect systems together (Suleman, 2010). It was created by the Open Archives Initiative for repository interoperability (McCallum, 2006). Sompel et al. (2004) describe interoperable repositories as repositories that can act as data providers, exposing structured data through the protocol or as service consumers, making requests through the protocol to harvest metadata from the providers. Such repositories consist of six services provided over Hypertext Transfer Protocol (HTTP). These services which are presented in the form of verbs include: Get Record; Identify; List Identifiers; List Metadata Formats; List Records and List Sets (McCallum, 2006). Shearer (2003) uses a two-party model to describe how OAI-PMH supports interoperability. He explains that, at one end are the data providers, who employ the protocol to display metadata in various forms, while those at the other end are the service providers who use the OAI-PMH to harvest the metadata from data providers and then automatically process it to provide services. With these potentials of the protocol, the Open Access initiative mandates all archives promoting open access to make the metadata for their contents accessible via the protocol (Lagoze et al., 2002). As the open access initiative gains growing global acceptance, Suleman (2010) notes that the adoption of the protocol has become a common feature of all open access repositories, be it for ETDs, research publications or both.

2.2.3 Search/Retrieval via URL

Search/Retrieval via URL (SRU) is an Extensible Markup Language, an XML-based protocol that allows search queries over the internet. It uses the Contextual Query Language (CQL) standards, which explains syntax for representing queries to retrieve data from the repository and displays them in a structured form through XML (McCallum, 2006). The protocol is designed to aid remote searching (Library of Congress, 2009). It is specified in abstract terms and can be encoded into a RESTful URL or a SOAP message, which was formerly called SRW. SRU can generate batches of records, but each request is associated with a result set identifier (Suleman, 2010).

2.2.4 Z39.50 Protocol

Z39.50 is an international standard protocol used by networked computer systems for information retrieval. It enables information seekers to search different systems on a network or the Internet through the use of a single user interface (National Information Standards Organization, 2002). A user who uses a system supported by Z39.50 can search for electronic information in another system supported by Z39.50 without needing to understand the workings of that system (National

Information Standards Organization, 2002). The protocol operates in a client/ server environment and on a common language that all Z39.50-supported systems can understand. For Z39.50 communication and interoperation to take place, both the client and the server must be able to speak the Z39.50 language. Most Z39.50 implementations use the standard TCP/IP Internet communications protocol to connect the systems and Z39.50-compliant software to translate between them for search and retrieval. To the users this all happens behind the scenes; they simply see their familiar search and display interface (National Information Standards Organization, 2002, 3-4). The protocol was originally designed to aid searching of vast bibliographic databases like those of OCLC and the Library of Congress. However, its application now covers a broad spectrum of library functions including database searching, cataloging, inter-library loan and reference. With the exponential expansion of the Internet, the Z39.50 standard has become widely accepted as a panacea overcoming barriers to retrieving multi-media information including text, images and digitized documents. The protocol is employed for accessing a variety of data such as museum data, government information and geospatial data. It is also applicable to searching online databases and CD-ROMs that vendors develop. Without having to learn each system, users can search those databases with a single Z39.50 client, even though each uses a different hardware and software configuration, stores different types of data and has different internal search logic (National Information Standards Organization, 2002).

A number of institutions of higher learning developing institutional repositories have been complying with standards of interoperability and metadata harvesting. In Italy, Bevilacqua (2007) acknowledges the growing adoption of ETDs in the country and attributes this trend to the impetus provided by the 2004 Messina Conference on Open Access, where most rectors of Italian universities subscribe to the Berlin declaration on Open Access. In subsequent years, similar trends are seen in the United States. Younglove (2013) observes that the pioneer institutional repositories in American colleges and universities are based on researcher-centric models and on library Open Access publishing movement. Seven years later, a review by Alipour-Hafezi et al (2010) reveals that most of the digital libraries which are found to be concentrated in America, adopt OAI protocol and the harvesting model. However, the review indicates that the libraries have a greater preference for metadata interoperability than full-text interoperability. Similarly, Sawant (n. d.) reported that nearly all institutional repositories in sixteen Indian tertiary institutions which were surveyed, mainly comply with OAI-PMH, while a few comply with OpenURL.

2.3 Software Adopted for Electronic Theses and Dissertations' Development in Federal University Libraries

The term software is used to refer to a set of detailed and coded instructions that control the operations of a computer system (Uzomba et al., 2021). Electronic theses and dissertations' development software could be described as a set of instructions which aids the performance of a task related to converting print theses and dissertations into electronic forms on a computer or any other information and communication technological device or tool. This software is usually associated with institutional repository development software. According to Rahman and Mezbah-Ul-Islam (2014), institutional

repository software can be open-source or commercial software. Open source software is free software developed for the enhancement of library routine activities. It is not necessarily cost-free, but is free to use, free to modify and free to share (Uzomba et al., 2021). On the other hand, commercial software refers to software which has to be purchased before it can be adopted for library operations. Ezema and Igbo (2016) observed that an ICT-issue associated with ETDs is the choice of software for their management. Ezema and Igbo suggested that universities can consider open-source software such as DSpace and Greenstone for the management of the development of ETDs. To aid understanding of the review which is conducted in this section, conceptual clarification on the major software adopted for ETD development is provided below:

2.3.1 DSpace

DSpace, which was released by HP-Minnesota Institute of Technology Alliance in 2002, is open source software that serves as a device for managing digital assets and as a platform for executing digital preservation. It is popularly used as a foundation upon which an institutional repository is established. It provides support for the storage of diverse forms of data, which include books, theses and 3D digital scans of objects, photographs, film, video, research data sets and other forms of content. The data is arranged as community collections of items, which bundle bit streams together (Reddy & Kumar, 2013). Each data stored in the system has a unique identifier that contains metadata. Dspace supports Dublin Core, OAI-PMH 2.0 and Open URL. It adopts the system of the Corporation for National Research Initiatives (CNRI) to assign persistent identifiers. The software aids data export to either the format of Extensible Markup Language (XML) or to that of Metadata Encoding and Transmission Standard (METS) (Masiye, 2019). While the software can handle diverse forms of data, it is mainly used for developing text document repository. It is characterized by an ingest process, which permits authorised users to submit their own materials to the repository. This process can be customized to include workflows for editing or checking metadata, approving submission before public availability, and adding default metadata values. The default metadata standard that the software uses is the qualified Dublin Core based loosely on the Dublin Core Library Application Profile (Dublin Core Metadata Initiative Libraries Working Group, n. d.). DSpace is compliant with OAI, which enables service providers to harvest bibliographic data to integrate into their systems. The default allows only three fields, which are title, language and date. However, the software can be customized to use other application profiles for metadata like the AGRISAP, which is designed for describing agricultural documents (Madalli et al., n. d.).

2.3.2 EPrints

EPrints was developed at the University of Southampton School of Electronics and Computer Science in 2000 and released under a GPL license for developing open access repositories that follow the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). It possesses a good number of the characteristics usually associated with document management systems, but is mainly used for institutional repositories and scientific journals (Reddy & Kumar, 2013). In

terms of standards, Eprints supports EPrints, OAI-PHM and the metadata have their own inner format. Eprints allows the importation of data from documents on XML format and some external resources such as PubMed XML. The export of data is also possible in several formats, XML, RSS, DublinCore, and METS. Eprints provides administration of user accounts. It enables search using the interface as well as in the metadata. Eprints indexes text files and other common formats such as PDF. It also allows browsing the logical tree structures, its intro structure is the same as in the Library of Congress, but it can be modified. The interface further enables registration of new users, to inform them about news and to provide them with feeds and e-mail alerts to keep them up to date (Masiye, 2019).

2.3.3 Greenstone

The software is issued under the terms of GNU General Public License. It serves as a means of developing, maintaining and sharing digital library collections, creating new rooms for organizing information and making it available over the Internet or on CD-ROM (Reddy & Kumar, 2013). The Greenstone collections take the form of text, images, audio and video. Searches for these collections can be conducted for particular words which exist in a text, or within a section of a document. Browsing can also be executed by title or by subject. The software prepares full-text indexes from the document text. These indexes can be used to search for particular words, combinations of words or phrases. The results are presented based on the appropriateness of the queries. With most of the documents in these collections, one can find descriptive data like author, title, date and keywords. The collections are accessed over the Internet or published, in exactly the same form, on a self-installing Windows CD-ROM. Compression is used to compact the text and indexes. A protocol called “Corba Protocol” provides support for distributed collections and graphical query interfaces (Masiye, 2019).

2.3.4 Fedora

Fedora (Flexible Extensible Digital Object and Repository Architecture) is repository software which resulted from the collaborative effort of Cornell University Information Science and University of Virginia Library. It is intended as open-source repository software and to support diverse kinds of management information systems in the provision of allied services (Sharma & Saha, 2008).

2.3.5 Electronic Thesis and Dissertation database (ETD-db)

The Electronic Thesis and Dissertation database (ETD-db) was developed at Virginia Tech by Digital Library and Archives for the Virginia Tech Graduate School and the Networked Digital Library of Theses and Dissertations (NDLTD). The software is made available free of charge and more than one hundred universities worldwide have implemented the ETD-db system (Volpe et al., n. d.). The ETD-db system consists of a series of web pages which is used to manage a collection of electronic theses and dissertations. It has different web pages which enable different types of

users to submit, search, browse, catalog, maintain and approve ETDs. With these features, some universities have been adopting the ETD-db system for nearly ten years (NDLTD, 2007). It is composed of Perl scripts for the web pages, a MySQL database and a web server (McMillan, 2005).

Selection of ETDs is an essential part of electronic theses and dissertations' development process and it requires software. Swain (2010) found that the most widely-adopted software in choosing ETDs are DSpace and EPrints. Copeland and Penman (n. d.) note that the Robert Gordon University (RGU) in the UK adopted a number of software at the initial stage of developing electronic theses which have already been tested and used by respected institutions and these software were identified to include DSpace, EPrints, Virginia Tech. ETD-db, Greenstone and so on. Copeland and Penman (n. d.) further noted that the university has opted to make more experimentation with DSpace and EPrints software for the development of its electronic theses. Wong (2006) observes that the City University of Hong Kong Library adopts Virginia Tech-generated E-thesis-specific ETD-db or generic repository software such as DSpace or E-Prints for both their ETD repository and institutional repository. Chowdhury et al. (2011) found that ICDDR'B and BRAC University, a leading private university in Bangladesh, develop institutional repositories using Dspace. The same year, Sheeja (2011) noted that the Indian ETD repository called "Shodhganga" employs DSpace. In a study primarily designed to study issues concerning institutional repository software/system involved in developing and managing an institutional repository in Indian sixteen tertiary institutions, including universities, Sawant (n. d.) found that 79% institutions had implemented DSpace institutional repository software package. Result from a study by Khan and Sheikh (2022) shows that free and open-source software is being used mostly in seventeen public and private universities out of twenty-three public and private universities in Islamabad, which have developed institutional repositories (IRs). Result from a subsequent study by Gayan (2014) reveals that most of the Indian ETD repositories adopt DSpace for repository development. In a subsequent research, Gurikar and Hadagali (2021) found that Dspace and Eprint are being widely used for building IRs in India. In Nigeria, Salau and Oyedum (2019) observe that some of the public university repositories in the country use open-source repository software for development and implementation of electronic theses and dissertations, while others build proprietary software to manage such collections.

2.4 ICT Facilities Available for Electronic Theses and Dissertations' Development in Federal University Libraries

Ebijuwa (2005) defined ICT as tools used for collection, processing, storage, transmission and dissemination of information. Information and communication technological facilities, in the context of this study, refer to the electronic or digital equipment or tools employed for the development of electronic theses and dissertations in university libraries. The feasibility of the development of electronic theses and dissertations in university libraries greatly depends on the availability of ICT facilities. This probably explains why Salmi (2008) attributes the rapid adoption and development of ETD programs in countries like America to the integration of, among other factors, availability of required infrastructure. This is even more applicable to developing countries, where availability

of required information and communication technology (ICT) infrastructure has been identified as one of the main factors that have encouraged universities in adopting ETD programs in many developing countries (Salmi, 2008). Similar trend is possible in university libraries of the Arab Gulf States which are said to have infrastructure for ETD programs (Salmi, 2008). These facilities or infrastructure are diverse. Ezema and Igbo (2016) identified the ICT facilities needed by a university to manage ETDs internally to include ICT hardware like computers (including work stations), scanners, digital cameras and off-line storage devices such as DVDs, flash drives and so on. Most of these ETD development facilities are tools employed for digitisation of print theses and dissertations, which is one of the methods of developing electronic theses and dissertations. According to Partha and Patra (2014), these digitization tools comprise computer technologies, processing technology, communication technologies and display technologies. On his part, Jagboro et al. (2012) identified these tools to include computer systems, scanners which can be flatbed, handheld or sophisticated scanning machines like SMA 2 and Kirtas, digital cameras or camera phones, CD or DVD writer and printer. Otubelu and Ume (2015) noted that digitization can be done using digital storage media, high speed scanners and high bandwidth networks.

It is now necessary to review empirical studies which provide insight into the availability of ICT facilities for electronic collection development. The findings from a study by Anaehobi (2007) indicate a number of ICT facilities available in academic libraries (federal university libraries inclusive) in Anambra state. Among the ones which can be used for ETD development are computers and CD-ROMs which are found to be available in all the libraries and scanners and Local Area Network (LAN) which are available in some of the libraries. Findings from a study by Ridwan et al. (n. d.) reveal that the ICT facilities available for digital preservation in Kashim Ibrahim Library, Ahmadu Bello University, Zaria, which can also serve as ETD development facilities, are computer system, scanner, Internet and storage devices. Result from a research by Etebu (2010) confirmed the availability of computers, UPS, CD-ROMs and LAN for patrons' use at Niger Delta University (NDU) main Library and Niger Delta University College of Health Sciences (NDUCHS) Library, with the main university library having a higher number of these facilities.

In providing insight into the availability of ICT facilities in four public university libraries and six private university libraries in Chennai and Kattankulathur respectively, Sivakumaren et al. (2011) rated the level of availability of ICT facilities in the public university libraries in descending order of computers, printers, scanners and photocopiers. The findings also indicate that all both public and private university libraries provide internet facilities. The same year, Anunobi et al. (2011) reported that while most of the eight (8) university libraries in South-East Nigeria, which the researchers surveyed, can boast of stand-alone computers, network operating systems and LAN (Local Area Network), some of the libraries have their electronic information resources on mainly CD-ROM (Compact Disc Read Only Memory. The following year, Ugwuanyi (2012) identified a number of ICT facilities available in South-East universities, which are can also be employed for ETD development. These include computers, interconnectivity, LAN, CD-Writer and scanner. Enakrire (2015) reported from a study which focused on identification of IT facilities available in KwaZulu-Natal and University of Ibadan libraries in Nigeria and South Africa, that (84.2%) of the Nigerian university libraries have personal computer, (72.7%) have CD-ROM, while (57.9%) have Local Area Network

(LAN), Internet and e-mail facilities. Result from a subsequent study by Adeniran et al. (2020) highly rated the availability of ICT facilities in seven (7) academic libraries in Kwara State, Nigeria. Among these facilities, the ones which are relevant for ETD development include computers, CD, DVD and internet connectivity. In examining the ICT facilities available and used for research output at the University for Development Studies Library in Ghana, Banleman et al. (2022) reported a number of ICT facilities which are less available in it libraries. Among these facilities which can be applied for ETD development are CD-ROM technologies.

2.5 Strategies Adopted for Electronic Theses and Dissertations' Development in Federal University Libraries

Simeone (2020) views strategy as how ends or goals will be achieved by a particular means or resources. In this study, electronic theses and dissertations' development strategy is viewed as the various approaches to building or expanding collections of electronic theses and dissertations in university libraries. Babu (2015) identified the following ways of building e-information resources: digitizing existing important and useful print material; subscribing various online information resources such as e-journals, e-books audio video resources etc; creating links and pointers to resources which are freely available on the internet and can be added to the library catalogues databases and networked resources and developing digital repositories.

Digitisation is one of the popular strategies which university libraries adopt for developing electronic theses and dissertations in their collection. Ifijeh (2014) views digitization as the process of documenting information in electronic format and making such information available through such media as compact discs (CDs), the internet and so on. A report by Kakai (2009) reported that theses and dissertations are digitised and archived in the institutional repository of Makerere University, Uganda. The researcher further notes that, because copyright ownership of the theses is not stated in the document, the authors' consents are sought. In Nigeria, Baro et al. (2014) found that only a few Nigerian university libraries digitise theses and dissertations. This is not far removed from what was observed by Ezema and Igbo (2016) that collection of print forms of theses and dissertations is still typical of many Nigerian university libraries. The digitization process usually involves scanning print theses and dissertations. Massachusetts Institute of Technology's (MIT) Theses in DSpace (2002) repository which contains selected theses and dissertations from all MIT departments and contains approximately 10,000 theses completed at MIT between 1879 and the present, explains that that after 2004, all new Masters and Ph. D theses would be scanned to be added to the repository after degrees have been awarded.

Another means by which university libraries develop electronic theses and dissertations is by making submission of electronic copy of theses and dissertations by students compulsory or optional. Smith (2002) notes that some universities populate their ETD repository by instituting an electronic copy theses requirement in certain departments only. Smith provides insight into the pilot program in Vanderbilt University where certain department participate on a voluntary basis, while those within those departments are under compulsion to submit electronic version. Smith further observes that the University of Kentucky's students are given the option of submitting either a print copy

or an electronic version to its repository. Yiotis (2008) re-affirms this optional practice at the University of Kentucky. However, Virginia Tech has phased out submission of print copy of theses and dissertations to its repository, and has made electronic copy submission mandatory for students. This policy took effect from January 1997 (Seamans, 2003). Similarly, students at West Virginia University are also required to submit electronic version of their theses and dissertations to the university (Smith, 2002). Sheeja (2011) stated that Indian ETD repository, which is called Shodhganga, obtains content in two ways: either by entering into an agreement with a university to obtain any digital theses that have already been archived there or theses that have been submitted by individual scholars. A research scholar or supervisor or a representative of the university under the university's mandate can submit a digital thesis directly to Shodhganga with permission from INFLIBNET (the Information and Library Network, an Inter-University Centre of the University Grants Commission).

Another popular method for developing electronic theses and dissertations in university libraries is the establishment of institutional repository (IR). An institutional repository (IR) can be defined as an online collection of information resources emanating from intellectual or academic activities of students, lecturers and researchers of a university. It has been conceived as an archive for gathering, preserving and disseminating digital documents of scholarly output in an organization, especially in scholarly and research institutions (Mapulanga, 2013). This is why ETDs are a prime candidate for electronic archiving because there are fewer restrictions on their dissemination, unlike research articles and papers, and modern theses and dissertations are all produced electronically (Suleman, 2010). In an academic institution, an IR normally incorporates materials, such as monographs, reprints of academic institutional journal articles both previously (preprints) and then after (post-prints) after going through companion peer-review and electronic dissertations and theses (Mostofa et al., 2015). Electronic theses and dissertations constitute a cardinal part of the content of an institutional repository of a university. Das et al. (2007) point out that some institutional repositories in India are specifically designed for hosting ETDs. In view of the potential of adopting institutional repository for building collections of electronic theses and dissertations, Ezema (2011b) advocate the establishment of institutional repositories where theses and dissertations will be digitised for global visibility of African research findings.

2.6 Challenges in Electronic Theses and Dissertations' Development in Federal University Libraries

Among the challenges in building ETD collections in university libraries, copyright appears to be the top obstacle. For example, Hirwade (2011) found that the biggest issue in developing ETDs repository in India is copyright. According to the author, among the institutions studied in India, all the seventeen ETD repositories cited copyright as a major issue. This is followed by "unwillingness of the researchers" to deposit their theses. It has been similarly noted that the biggest constraint faced by the administrators in developing ETD repository is copyright and Intellectual Property Rights, unwillingness of the researchers to deposit their theses, fear of plagiarism, problem of long-term preservation, lack of institutional policy, funding problem, lack of necessary infrastructure (Khaparde

& Ambedkar, 2014). Das et al. (2015) observed that intellectual property rights are major problem of concern for the integration and collaboration of ETD projects that were designed and developed individually. Greig (2005) reported that many UK university libraries are introducing ETDs and identified the challenges during implementation to include funding and copyright issues. Perry and Callan (2006) point out that the main problem with retroactively distributing electronic versions of paper to ETDs is the difficulty in getting the permission of the author. Thus, Kuny and Clevaland (2009) maintain that copyright could end up preventing libraries from providing OA to the digital information they collect. This, perhaps, explains why Carlson (2003) found that students, professors and administrators at the English and History Departments opposed Ohio State University plan to put dissertations online. While the university claimed the policy conforms to the University's mission, students and administrators objecting the policy say that posting the documents online could reduce student's chances of publishing the dissertation in journal or university presses, with the implication of whether that was going to take control of the copyright out of the hands of the students and into the hands of the university. Copeland (2008) noted that the slow transition from print theses and dissertations to ETDs is partly as a result of lack of investment in relevant research and development. Many individuals and institutions were working in isolation or in an unfunded capacity and facing technical, legal, administrative and political challenges which required a considerable amount of staff time to resolve. Satyanarayana and Babu (2007) identified the following issues as possible causes for the slow progress in the implementation of ETDs in India: high volume of research output, Intellectual property issues, concerns with plagiarism, quality of research produced in India, concern with long-term preservation, limited support from librarians, lack of trained staff, limited number of training programmes, and limited number of access aggregators. Similarly, Salmi (2008) stated that university libraries of the Arab Gulf States have technological, administrative, and legal barriers in executing ETD programs. This situation probably explains why it was found in a subsequent study by Vijayakumar et al. (2007) that Indian university libraries seek policies from government agencies such as the University Grants Commission, as well as infrastructure support, technical expertise and financial support from their own institutions in order to create ETD systems on their campuses.

In Africa, Mbambo-Thata (2007) reported that during the implementation of DATAD, ETDs and the institutional repository at the University of Zimbabwe, a number of challenges were encountered, mainly, lack of clearly documented set of policy on copyright and no clearly-stated theses' submission policy as every department followed different channels with some theses lacking abstracts. In Nigeria, Alhaji (2007) evaluated the status of ETDs in Nigerian university libraries and found that, although, there are automated services in the university libraries surveyed, theses and other local contents materials have not been digitized, due to lack of funds, facilities and skilled staff and the constant failure of power supply. Result from a subsequent study on the challenges of digitizing theses and dissertations in Nigerian university libraries conducted by Ezema and Ugwu (2013) reveal that the major challenges of ETDs projects in the universities they surveyed include irregular power supply, poor funding, lack of IT personnel, and absence of ETDs policy. Baro et al. (2014) found that challenges in the adoption of ETDS in university libraries in Nigeria include unstable internet connectivity, lack of funding, irregular power supply, lack of information

technology personnel, absence of electronic theses and dissertations submission policy and copyright issues. The result of a study by Mole and Obidike (2016) indicate that electronic collection development is not yet very effective in Nigeria university libraries. The study identified the major factors militating against electronic collection development to include inadequate funding for automation which is also at infancy level, poor technical knowhow, lack of higher bandwidth in Internet connectivity and lack of sound administrative policies and guidelines. A study by Salau and Oyedum (2019) found that the major sustainability challenges with ETDs in Nigerian repositories are funding, content population, poor synergy between IT and library staff and inadequately-skilled staff. Moreso, the inability to procure a hosting software and centre has been acknowledged as another barrier to ETD development in Africa. Kakai (2009) points out that one of the major problems of ETDs in Africa is obtaining the software and a location to host it. Kakai further observes that, in most cases, the software is hosted in European or American countries, which makes uploading of large files very difficult.

3. Methodology

The study adopted descriptive survey research design. The study was conducted in the six geo-political zones of Nigeria, which are North-Central, North-West, North-East, South-South, South-East and South-West. The population of the study comprised all the forty-eight institutional repository librarians in Nigerian federal university libraries. Purposive sampling technique was used to select eighteen institutional repositories in eighteen Nigerian federal university libraries. The researchers established the existence of these repositories from preliminary investigation of their websites and from the webpage of the International African Institute (2023). Total enumeration sampling technique was then used to select forty three librarians from the eighteen institutional repositories in the university libraries because the population was small and manageable. The instrument for data collection was a self-designed questionnaire, titled “Electronic Theses and Dissertations’ Development Questionnaire (ETDDQ)”. The questionnaire consisted of two sections. Section A and B. Section A covered information on the background of the librarians while Section B had six (6) clusters with cluster A dealing with Policies Available for Electronic Theses and Dissertations’ Development, Cluster B with Compliance with Standards for Electronic Theses and Dissertations’ Development, Cluster C with Software Adopted for Electronic Theses and Dissertations’ Development, Cluster D with Facilities Available for Electronic Theses and Dissertations’ Development, Cluster E with Strategies Adopted for Electronic Theses and Dissertations’ Development and Cluster F with Challenges in Electronic Theses and Dissertations’ Development. Cluster A was rated as Available (0) and Not Available (0); Cluster B as Compliant (1) and Not Compliant (0); Cluster C as Adopted (1) and Not Adopted (0); Cluster D as Available (0) and Not Available (0), Cluster E as Adopted (0) and Not Adopted (0) and Cluster F as Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1). The instrument was validated by experts in Library and Information Science and in Measurement and Evaluation at Niger Delta University, Bayelsa State, Nigeria.

The instrument was subjected to reliability test by conducting a pilot test on ten librarians in four South-Eastern state university libraries, which were found to operate institutional repositories or digital libraries. Kudder Richardson's formula was used to determine the internal consistency of the instrument for clusters in which items were rated as Available and Not Available; Compliant and Not Compliant; Adopted and Not Adopted. This choice was considered appropriate for these clusters of the instrument because, according to Nworgu (2015), Kudder Richardson's formula is used for establishing the reliability of instrument whose variables have two response options. The test using Kudder Richardson's formula resulted in coefficient values of 0.67, 0.72, 0.78, 0.69 and 0.75 for clusters A, B, C, D and E respectively. The overall coefficient value for all the clusters was 0.72. Cronbach Alpha was used to establish the internal consistency of the instrument for cluster F in which the items were scaled as Strongly Agree, Agree, Disagree and Strongly Disagree. The Cronbach Alpha was employed because the items in these clusters were measured on several points. This is consistent with Nworgu (2015) who asserts that Cronbach Alpha is appropriate for determining the internal consistency reliability of variables that are measured on several points such as opinion scales. The test using Cronbach Alpha produced a coefficient value of 0.75. The overall coefficient value for the whole instrument was 0.74. Thus, the instrument was considered appropriate for the study based on the assertion by George and Mallery (2003) that reliability coefficient of 0.7 and above is acceptable.

The researchers visited the university libraries and administered forty eight copies of the draft of the validated questionnaires to the librarians with the help of research assistants. The questionnaires that were completed on the spot were retrieved immediately by the researchers, while the rest were retrieved later upon completion. Trained research assistants were also assigned to retrieve questionnaires which the respondents took time to fill in. These were returned to the researchers through courier service. Forty three copies of the draft of the questionnaire were properly filled in and returned, producing a response rate of 89.58%. Data collection spanned a period of three months. This was achieved after reminder calls and emails were made and sent respectively. The data collected were analyzed by means of weighted mean and standard deviation. The criterion point established for Section A-E was 0.50 while that for Section F was 2.50. Thus, items in Sections A-E whose mean was 0.50 and above were regarded as Available, Adopted or Compliant, while those with means less than 0.50 were regarded as Not Available, Not Adopted or Not Compliant. As for Section F, items with means equal to 2.50 and above were considered as "Agreed" as a Challenge, while those whose means were less than 2.50 were considered as "Disagreed" as a Challenge.

4. Results

This section presents the results of the study in line with the research questions earlier formulated to guide the study.

- **Research Question 1:** What are the policies available for electronic theses and dissertations' development in federal university libraries in Nigeria?

Table 1. Mean responses of librarians on the policies available for electronic theses and dissertations' development in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	The administrator only vets items for the exclusion of spam	0.76	0.08	A
2.	Items should only be deposited by academic staff and registered students	0.87	0.09	A
3.	Items may only be deposited by their delegated agents	0.48	0.05	NA
4.	Submission of ETDs should be compulsory for students	1.00	0.10	A
5.	Submission should be optional	0.00	0.00	NA
6.	Only digital/IR librarians should develop ETDs	0.67	0.07	A
7.	Provide free access to the ETDs	1.00	0.10	A
8.	Provide pay-per-view access to the ETDs	0.00	0.00	NA
	Grand Mean and Standard Deviation	**0.60**	**0.06**	**Available**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation; A=Available; NA: Not Available; IR=Institutional Repository; ETDs=Electronic Theses and Dissertations

Table 1 indicates that the policies available for electronic theses and dissertations' development in federal university libraries in Nigeria are policies that require only the administrator to vet items for the exclusion of spam, deposition of items by only academic staff and registered students, submission of ETDs compulsory for students, engagement of digital/IR librarians in the development of ETDs and provision of free access to ETDs.

- **Research Question 2:** Do federal university libraries in Nigeria comply with standards for electronic theses and dissertations' development?

Table 2. Mean Responses of librarians on compliance with standards for electronic theses and dissertations' development in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	Open Archives Initiative Protocol for Metadata Harvesting	0.87	0.09	Compliant
2.	Search/Retrieval via URL	0.67	0.07	Compliant
3.	Z39.50 protocol	0.45	0.05	Not Compliant
	Grand Mean and Standard Deviation	**0.66**	**0.07**	**Compliant**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation

Table 2 shows that the federal university libraries in Nigeria comply with standards of Open Archives Initiative Protocol for Metadata Harvesting and Search/Retrieval via URL in developing electronic theses and dissertations. However, the libraries do not adhere to Z39.50 protocol.

- **Research Question 3:** Which software are adopted for electronic theses and dissertations' development in federal university libraries in Nigeria?

Table 3. Mean Responses of librarians on the software adopted for electronic theses and dissertations' development in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	DSpace	0.87	0.09	Adopted
2.	EPrints	0.43	0.04	Not Adopted
3.	Greenstone	0.45	0.05	Not Adopted
4.	Fedora	0.47	0.05	Not Adopted
5.	Virginia Tech. ETD-db	0.00	0.00	Not Adopted
	Grand Mean and Standard Dev.	**0.44**	**0.05**	**Not Adopted**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation

Table 3 reveals that the software adopted for electronic theses and dissertations' development in federal university libraries in Nigeria is DSpace.

- **Research Question 4:** Which ICT facilities are available for electronic theses and dissertations' development in federal university libraries in Nigeria?

Table 4. Mean responses of librarians on the ICT facilities available for electronic theses and dissertations' development in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	computers	0.68	0.07	Available
2.	scanners	0.53	0.05	Available
3.	digital cameras	0.45	0.05	Not Available
4.	camera phones	0.36	0.04	Not Available
5.	DVDs	0.46	0.05	Not Available
6.	flash drives	0.37	0.04	Not Available
7.	CD-ROM	0.51	0.05	Available
8.	DVD writer	0.43	0.04	Not Available
9.	CD writer	0.35	0.04	Not Available
10.	Printer	0.54	0.05	Available
11.	LAN	0.57	0.06	Available
12.	MAN	0.47	0.05	Not Available
13.	WAN	0.28	0.03	Not Available
14.	Internet connectivity	0.67	0.07	Available
	Grand Mean and Standard Dev.	**0.48**	**0.05**	**Not Available**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation; LAN: Local Area Network; MAN: Municipal Area Network; WAN: Wide Area Network

Table 4 indicates that the ICT facilities available for electronic theses and dissertations' development

in federal university libraries in Nigeria are computers, scanners, CD-ROM, Local Area Network, internet connectivity and printer.

- **Research Question 5:** What are the strategies adopted for electronic theses and dissertations' development in federal university libraries in Nigeria?

Table 5. Mean responses of librarians on the strategies adopted for electronic theses and dissertations' development in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	Digitisation	0.84	0.08	Adopted
2.	Making submission of electronic copy of theses and dissertations compulsory for students	0.79	0.08	Adopted
3.	Making submission of electronic copy of theses and dissertations optional for students	0.00	0.00	Not Adopted
4.	Creation of institutional repository	0.78	0.08	Adopted
	Grand Mean and Standard Deviation	**0.60**	**0.06**	**Adopted**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation

Table 5 discloses that the strategies adopted for electronic theses and dissertations' development in federal university libraries in Nigeria are digitisation, making submission of electronic copy of theses and dissertations compulsory for students and creation of institutional repository.

- **Research Question 6:** What are the challenges in developing electronic theses and dissertations in federal university libraries in Nigeria?

Table 6. Mean responses of librarians on the challenges in developing electronic theses and dissertations in federal university libraries in Nigeria

S/N	Items	$\bar{\chi}$	SD	Remarks
1.	technological obsolescence	2.75	0.28	Agreed
2.	financial constraints	2.89	0.28	Agreed
3.	unwillingness of the students to deposit their theses and dissertations	2.47	0.25	Disagreed
4.	lack of clearly-defined ETD development policy	2.57	0.26	Agreed
5.	lack of necessary ICT infrastructure	2.83	0.28	Agreed
6.	lack of trained staff	2.78	0.28	Agreed
7.	epileptic power supply	2.77	0.28	Agreed
8.	copyright issue	2.67	0.27	Agreed
9.	unstable internet connectivity	2.78	0.28	Agreed
	Grand Mean and Standard Deviation	**2.72**	**0.27**	**Agreed**

Key: $\bar{\chi}$=Mean; SD: Standard Deviation; SA=Strongly Agree; A=Agree; D=Disagree and SD=Strongly Disagree

Table 6 shows that the challenges in developing electronic theses and dissertations' development in federal university libraries in Nigeria are technological obsolescence, financial constraints, lack of clearly-defined ETD development policy, necessary ICT infrastructure, trained staff, issue of copyright, epileptic power supply and unstable internet connectivity.

5. Discussion

The study reveals that the policies available for developing electronic theses and dissertations in Nigerian federal university libraries require that students submit electronic copies of their theses and dissertations, digital/IR librarians are involved in developing electronic theses and dissertations (ETDs) and free access is granted to ETDs. This is in line with Ezema and Igbo (2016) who maintain that ETDs policies centre on, among others, the process of submitting the theses and dissertations, roles and responsibilities of the university library and method of access to the ETDs, which can be either free or paid. The finding also agrees with Copeland (2008) who notes that the submission policy should stipulate whether their submission by students is be optional or compulsory. The result probably turned out this way because many of the university libraries subscribe to the Open Access Initiative. Thus, the libraries have formulated policies which help to promote the cause of Open Access.

The research also shows that the university libraries comply with standards of Open Archives Initiative Protocol for Metadata Harvesting and Search/Retrieval via URL in developing electronic theses and dissertations. The result agrees with Younglove (2013) who notes that American pioneer institutional repositories hinge on open access initiative. It is also consistent with the practice of Italian universities where most university heads support the Berlin declaration on Open Access (Bevilacqua, 2007). It is also in consonance with the conclusion reached from a review by Alipour-Hafezi et al. (2010) that most American-based digital library interoperability models adopt Open Access Initiative (OAI) protocol for Metadata Harvesting. The finding is in line with the fallout of the study by Sawant (n. d.) which reveals that nearly all institutional repositories in sixteen Indian tertiary institutions, which were surveyed, primarily follow OAI-PMH, while a few comply with OpenURL. It is also in line with Suleman and Fox (2003) who maintain that, despite the kind of software an institutional repository adopts, all institutional repositories comply with interoperability and metadata harvesting standards. The university libraries' drive to promote Open Access to indigenous knowledge could have led to this outcome.

The investigation also indicates the university libraries employ DSpace for building ETDs. The result agrees with Swain (2010) who observes that the most popular software used for selecting ETDS are DSpace and EPrints. This is also consistent with the outcome of the study by Sawant (n. d.) which indicates that 79% of Indian tertiary institutional repositories employ DSpace. However, the present study nullifies the adoption of Eprints. Similarly, it tallies with the finding of Gayan (2014) which indicates that a good number of the Indian ETD repositories employ DSpace for repository development. The result also resembles that of the practice of Nigerian public universities where some universities adopt open-source repository software while others use proprietary software

for developing and managing ETDs (Salau & Oyedum, 2019). The popularity in the use of open source software for electronic collections development and management among university libraries with remarkable success and perceived ease of adoption of such software may have contributed to the choice of DSpace by the university libraries.

Furthermore, the study discloses that the ICT facilities available for developing ETDs in the university libraries comprise computers, scanners, CD-ROM, LAN, internet connectivity and printer. The result is consistent with that of Anaehobi (2007), which identifies ETDs development relevant-ICT facilities available in academic libraries in Anambra state, Nigeria, to include computers, CD-ROMs, scanners and Local Area Network (LAN). It is also in consonance with the result of the study by Anunobi and Nwakwuo (2008) which shows that most of the eight South-East Nigerian university libraries, which they surveyed, have stand-alone computers and CD-ROMs. It partly agrees with the result of the research by Ridwan et al. (n. d., 1) which reveals that ICT facilities available for digital preservation at Kashim Ibrahim Library, Ahmadu Bello University, Zaria, which are also relevant for ETD development, are computers, scanner, internet and storage devices. It is also in line with the fallout of the investigation by Kattankulathur by Sivakumaren et al. (2011) which indicates that all the four public university libraries out of the ten university libraries which they surveyed in Chennai and Kattankulathur, have computers, printers, scanners and internet facilities. It is agrees with that of the study by Ugwuanyi (2012) which shows that ICT facilities available in the South-East Nigerian universities surveyed, which are vital for ETD development, are computers, interconnectivity, LAN and scanner. However, the finding of the current research nullifies the availability of CD-ROM writer in Nigerian federal university libraries, which the study of Ugwanyi found to be available. Moreso, it tallies with the finding of the research by Enakrire (2015) which attests to the availability of personal computers, CD-ROMs, LANs and Internet at the University of Ibadan libraries. It is also in line with the result from a subsequent study by Adeniran et al. (2020) which confirms availability of computers, CD/DVD and internet connectivity in most academic libraries in Kwara State, Nigeria. The poor attitude of government to the funding of Nigerian public universities could have limited the acquisition of sophisticated ICT tools for ETD development and probably compelled them to acquire only computers and its peripheral devices.

Moreso, the study highlights that the strategies that the university libraries adopt for developing ETDs involves digitisation, enforcing compulsory submission of electronic versions of theses and dissertations by students and establishment of institutional repositories (IRs). This is in line with Babu (2015) who opines, among other things, that electronic information resources are developed using digitization and developing online repositories. It is also consistent with the report by Kakai (2009) that theses and dissertations are digitised and archived in the institutional repository of Makerere University, Uganda. Moreso, it agrees with the result of the study by Baro et al. (2014) which attests to digitization of theses and dissertations in Nigerian university libraries, although, this practice was not widespread. It is also in agreement with the practice of West Virginia University where it is compulsory for its students to submit electronic version of their theses and dissertations to its repository (Smith, 2002). However, the result is contrary to the practices of Vanderbilt University and University of Kentucky where submission of electronic version of theses and dissertations by

students is optional (Smith, 2002; Yiotis, 2008). It is typical of university libraries to emulate the practices of sister universities which have made significant progress in digital librarianship. This tendency could have led Nigerian federal university libraries to adopt the core methods of developing ETDs such as digitization, creation of institutional repositories (IRs), etc.

Finally, the study brings to limelight that the obstacles faced by the university libraries in building ETDs include technological obsolescence, financial problems, absence of clearly-defined ETD development policy, required ICT facilities and trained staff, copyright, irregular power supply and unstable internet connectivity. This is consistent with Greig (2005) who reported that many UK university libraries encounter challenges with funding and copyright issues while implementing ETD projects. It also agrees with the outcome of the research by Alhaji (2007) which indicate that digitization of thesis and other local contents materials in Nigerian university libraries has been hindered by lack of finance, equipment, skilled personnel and epileptic power supply. It further agrees with that of Ezema and Ugwu (2013) which reveals that the primary obstacles to ETDs projects in Nigerian university libraries include irregular power supply, poor funding, lack of IT personnel and absence of ETDs policy. It is also in line with the outcome of the study by Baro et al. (2014) that the hindrances to the adoption of ETDS in Nigerian university libraries are unstable internet connectivity, lack of funding, irregular power supply, lack of information technology personnel, absence of electronic theses and dissertations submission policy and copyright issues. Moreso, it is consistent with the result which identifies the principal barriers to electronic collection development in Nigeria university libraries to include inadequate funding, poor technical expertise, lack of higher bandwidth, sound administrative policies and guidelines (Mole & Obidike, 2016).

6. Conclusion

The study examined electronic theses and dissertations' development in university libraries in Nigeria. It was focused on Nigerian federal university libraries. The study has provided the understanding that the policies available for developing electronic theses and dissertations (ETDs) in the university libraries demand submission of electronic copies of theses and dissertations by students, engagement of digital/IR librarians in ETD development and provision of free access to ETDs. The libraries adhere to standards of Open Archives Initiative Protocol for Metadata Harvesting and Search/Retrieval via URL in developing ETDs. The libraries engage in ETD development by means of open source software, DSpace, and employing strategies such as digitisation, obliging submission of electronic versions of theses and dissertations by students and establishment of institutional repositories. The process is facilitated by the availability of such ICT facilities as computers, scanners, CD-ROM, LAN, internet connectivity and printers in the libraries. However, the process is confronted by technological obsolescence, financial constraints, absence of concrete ETD development policy, ICT facilities and trained staff, issue of copyright, irregular power supply and unstable internet connectivity.

7. Recommendations

In the light of the findings of the research, it was recommended that:

1) The federal government should increase funding to Nigerian federal universities.
2) University management should sponsor librarians in Nigerian federal university libraries for regular trainings in digital library operations including electronic collection development.
3) University library management should develop concrete electronic collection development policies to guide electronic collection building in the university libraries.

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Appendix A: Electronic Theses and Dissertations' Development Questionnaire (ETDDQ)

Please complete the following information about your background as a librarian and tick √ as appropriate.

PART A: Demographic Information of Librarians

1. Name of University:

- **Section A:** Policies Available for Electronic Theses and Dissertations' Development in Federal University Libraries in Nigeria

- Item 1-8 show probable policies available for developing electronic theses and dissertations' in university libraries. Indicate the policies available in your university library using options: Available (1) and Not Available (0).

S/N	Items	Available (1)	Not Available (0)
1.	The administrator only vets items for the exclusion of spam		
2.	Items should only be deposited by academic staff and registered students		
3.	Items may only be deposited by their delegated agents		
4.	Submission of ETDs should be compulsory for students		
5.	Submission should be optional		
6.	Only digital/IR librarians should develop ETDs		
7.	Provide free access to the ETDs		
8.	Provide pay-per-view access to the ETDs		

- **Section B:** Compliance with Standards for Electronic Theses and Dissertations' Development in Federal University Libraries in Nigeria

- Items 1-3 show standards complied with in developing electronic theses and dissertations. Please indicate the standards your university library follows in developing electronic theses and dissertations using the options: Compliant (0) and Not Compliant (0).

S/N	Items	Compliant (0)	Not Compliant (0)
1.	Open Archives Initiative Protocol for Metadata Harvesting		
2.	Search/Retrieval via URL		
3.	Z39.50 Protocol		

• **Section C:** Software Adopted for Electronic Theses and Dissertations' Development in Federal University Libraries in Nigeria

- Items 1-5 show likely software university libraries adopt for building electronic theses and dissertations'. Please indicate the software your university library adopts using the options: Adopted (1) and Not Adopted (0).

S/N	Items	Adopted (1)	Not Adopted (0)
1.	DSpace		
2.	EPrints		
3.	Greenstone		
4.	Fedora		
5.	Virginia Tech. ETD-db		

• **Section D:** ICT Facilities Available for Electronic Theses and Dissertations' Development in Federal University Libraries in Nigeria

- Items 1-5 show ICT facilities which tend to be made available for the purpose of developing electronic theses and dissertations in university libraries. Kindly highlight the ICT provided in your university library for the same purpose using the options: Available (0) and Not Available (0).

S/N	Items	Available (1)	Not Available (0)
1.	computers		
2.	scanners		
3.	digital cameras		
4.	camera phones		
5.	DVDs		
6.	flash drives		
7.	CD-ROM		
8.	DVD writer		
9.	CD writer		
10.	Printer		
11.	LAN		
12.	MAN		
13.	WAN		
14.	Internet connectivity		

• **Section E:** Strategies Adopted for Electronic Theses and Dissertations' Development in Federal University Libraries in Nigeria

- Items 1-4 indicate possible strategies university libraries adopt for developing electronic theses and dissertations. Kindly highlight the strategies adopted by your university library using the options: Adopted (1) and Not Adopted (0).

S/N	Items	Adopted (1)	Not Adopted (0)
1.	Digitisation		
2.	Making submission of electronic copy of theses and dissertations compulsory for students		
3.	Making submission of electronic copy of theses and dissertations optional for students		
4.	Creation of institutional repository		

• **Section F:** Challenges in Developing Electronic Theses and Dissertations in Federal University Libraries in Nigeria

- Items 1-9 display likely challenges encountered by university libraries in developing electronic theses and dissertations. Please specify the challenges faced by your university library in building electronic theses and dissertations using the options: Strongly Agree (SA) (4), Agree (A) (3), Disagree (D) (2) and Strongly Disagree (SD) (1).

S/N	Items	SA (4)	A (3)	D (2)	SD (1)
1.	technological obsolescence				
2.	financial constraints				
3.	unwillingness of the students to deposit their theses and dissertations				
4.	lack of clearly-defined ETD development policy				
5.	lack of necessary ICT infrastructure				
6.	lack of trained staff				
7.	epileptic power supply				
8.	copyright issue				
9.	unstable internet connectivity				

Many thanks for your contribution to the success of this survey.

APPENDIX B: Sample Distribution of the Study

S/N	Names of University Libraries	No. of Librarians
1.	Federal University of Technology, Akure	3
2.	Federal University of Technology, Minna	3
3.	Federal University of Technology, Owerri	2
4.	Ahmadu Bello University	3
5.	Bayero University, Kano	2
6.	Michael Okpara University of Agriculture, Umudike	2
7.	Nnamdi Azikiwe University, Awka	3
8.	Obafemi Awolowo University,Ile-Ife	3
9.	University of Abuja, Gwagwalada	2
10.	University of Ibadan	4
11.	University of Ilorin	2
12.	University of Jos	3
13.	University of Lagos	1
14.	University of Nigeria, Nsukka	3
15.	University of Uyo	2
16.	Usumanu Danfodiyo University	2
17.	University of Portharcourt	2
18.	Federal University Oyo-Ekiti	1
	Total	**43**

APPENDIX C: Sample Distribution for Reliability Test

S/N	Names of University Libraries	No. of Librarians
1.	Enugu State University of Science and Technology	2
2.	Chukwuemeka Odumegwu Ojukwu University	2
3.	Abia State University	2
4.	Imo State University	3
5.	Ebonyi State University	1
	Total	**10**