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INFLUENCE OF PRESERVATION TECHNIQUES AND ACCESS TO DIGITAL RESOURCES ON RESEARCH OUTPUTS OF ACADEMIC STAFF IN FEDERAL UNIVERSITY LIBRARIES IN NORTHERN NIGERIA

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Abstract

The study investigated influence of preservation techniques and access to digital resources on the research output of Liberians and lecturers in Federal university libraries in Northern Nigeria. Three research questions and research objectives respectively guide the study to capture types of digital resources and preservation techniques utilized as well as access tools that facilitated the use of digital resources to enhance research output of librarians and lecturers. Descriptive survey research design was used and the target population consisted of 12,691 academic staff with breakdown of 161 librarians working in ICT unit of university libraries as well as 12,539 lecturers in various faculties in the 22 universities in Northern Nigerians. Multi-stage sampling techniques viz-a-viz proportionate stratifies sampling techniques was used to select 377 lecturers and 79 Liberians in nine universities. Two set of four point rating scale questionnaire was design and administered on 386 respondents. Mean and standard deviation was used to analysed data. Result showed that e-journal article, digitization and library catalogue top the list in terms of digital resource, preservation techniques and access tools used in research output of academic staff in federal university libraries in Northern Nigeria. Digital resources were used to disseminate research output. The conclusion was that e-journal article serve as plat form for convening current research findings and that digitization is the modern method of preserving paper- based materials in libraries. Easy access to information resources is made possible through library catalogue. The study recommended that management to universities in northern Nigeria should motivate academic staff to make scholarly contribution to other resources (text book, technical report etc) were among others.

Keywords: Academic staff; Accessibility; Research output; Digital resources; Preservation; University Libraries; Northern Nigeria.

Introduction

The concept of research has been viewed by different scholars from different perspectives and approaches. To some, it is a quest for knowledge, a systematic method of inquiring into existing phenomenon. Nevertheless, it is characterized as a carefully, but detailed and organized study that helps to substantiate information, proffering solution(s) to specific problems, concerns or

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issues affecting humanity source. Ibrahim (2013) described research as studious inquiry or systematic investigation of a phenomenon or series of phenomena by experimental method, in order to discover facts, establish or reverse a theory, or to develop a plan of action based on the facts discovered. There are different types of research methods, for example Sambo (2015) opined that applied research, case study research, *ex post facto* research, action research, and experimental research among others are different types of research.

Research is of great importance to national development of a nation. Research is meant for the purpose of affecting societal development and improvement. It is a way of acquiring functional, dependable and useful information and data about a particular object of research. Ochia (2013) while stressing the perceived importance of research, stated that research has an impact that transcends all spheres of human endeavour such as social, economic, political, educational, science and technology. Research in that respect serves as a determinant to the pace of growth and development of the entire society, he further stressed that achievement in research gave rise to the growth in science and technology which in turn lead to industrialization, creation of job opportunities, increased income, increased production of goods and services, creation of wealth, improved quality of life, improved transportation and communication system, networking the regions of the world, clustering of people and creating interactions among nations, socially, economically and politically.

The appropriate institutions charged with the responsibility of carrion out research for national development are the universities and the end product of research activities in universities is called research output. Research output are product of research published/presented legitimately, found worthy for academic purposes. Research output comprises of seminar papers, journal articles, conference proceedings, books, chapters in books, theses, dissertation, projects and web.

Research output is the key to universities across globe. In a typical library, research output comes in form of printed books, journals, conference papers, proceedings, thesis and dissertation among others. In the modern era, electronic versions of books, journals and magazines form the collections. The used of library's collection is affected by tear and wear of both the resources and facilitating gadgets, be they books, shelves, drawers, cabinets or computers, servers and inverters. The need to preserve these resources is therefore not questionable. To proactively respond systematically to the preservation of library resources, there is need for a holistic preservation technique. These techniques comprise technology preservation, preservation emulation, information migration, refreshing, replication, preservation software and encapsulation. However, the role of libraries is to support, facilitate and ensure access to their resources.

Accessibility to digital materials can only be made possible through electronic devices which serve as the access tools. Access tools information resources in libraries, according to Udofot (2019) included the following as access tools: catalogues, indexes, bibliographies, guides, abstracts and databases in computerized formats. The most commonly used especially in university libraries in Nigeria, is the library catalogue. The library catalogue according to Mohammed(2012) is a list of books and other graphic material in a library arranged according to a recognized order and containing specific items of bibliographical information for the purpose of identification and location of the material, some of the basic purposes of library catalogue are: To provide all the information necessary to describe all item accurately both physically and intellectually in order to distinguish it from every other items. To provide the location a particular library materials (books, periodicals, etc.) in the collection. Bibliographies are another types of access tool used by libraries.

Bibliography is a list of sources you used when writing a scholarly article or paper or a list of books or articles an author has published on a specific subject. An example of a bibliography is the list of sources writer or author include at the end of write-up or paper though not cited. The bibliography appears at the end of paper or write-up. The main purpose of a bibliography entry is to give credit to authors whose work you've consulted in your research. It also makes it easy for a reader to find out more about your topic by delving into the research that author used to write paper (Ozioko, 2014). There is also abstract as access tool which, according to Ezekwe and Muokebe (2012) is a summary of a research article, theses, review, conference, seminar and proceeding etc. The purpose of an abstract is to provide prospective readers the opportunity to judge the relevance of the longer work to their projects. Abstracts also include the key terms found in the longer work and the purpose and methods of the research.

The index, yet another type of access tool which contain list of terms and concepts systematically arranged to direct the use to where to locate the information. According to Encyclopaedia of library and information science (2013), " is a systematic guide to items contained in or concepts derived from a collection. These items or derived concepts are represented by entries arranged in a known or stated searchable order, such as alphabetical, chronological or numerical". Indexing helps to locate the position of the specific document in files at a short period of time. It helps to make a quick decision by providing necessary information stored in files. Therefore, indexing is very important to save time and effort of library users. Another type of access tool is database, according to lisbdnet.com (2014) database is a collection of information that is organised so that it can be easily accessed, managed and updated. Computer databases typically contain aggregations of data records or files, a database management system is important because it manages data efficiently and allows

users to perform multiple tasks with ease. Finding aids is also another access tools as it help a user find information in a specific record group, collection, or series of archival materials. Finding aids are documents that contain information about the material that is part of a collection. Finding aids are used by researchers to determine if the records in the collection or fonds hold information that is significant to their research. Finding aids include: published and unpublished inventories, container and folder lists, card catalogues, calendars, indexes, registers, and institutional guides. The guide is yet another type of access tool, guides are online web pages created by librarians to help patrons perform various tasks, such as using library resources or doing research work. The resources prone to failure of access are called digital collections.

Preservation of digital materials has gained significant prominence because of the roles it plays in combating theft, mutilation and distortion of information sources on one hand, and on the other hand in supporting the creation of digital contents that are valuable to research output. This has continued to grow exponentially because it has a distinguished set of processes; activities and management of information resources which over time ensures long-term accessibility and help to relatively change the short life-cycle of physical resources and retains its original letterings. Another dimension reiterates the different formats in which these materials exist, particularly with the inception and adoption of information and communication (ICTs) technologies which has been a tool in enhancing service delivery by libraries. Digital resources acquired by university libraries are characterised to save space, and support the creation and maintenance of repositories, and joining consortium.

Apart from the traditional methods of preserving collection in libraries, the modern method of preservation is through digitisation. Digitisation is the process of converting the printed materials into the digital/electronic format which can later form databases (Saka, 2013). The printed

information resources that could undergo digitization include: serial publication, project thesis/digitization and technical reports. The digital collection include: e-Journal, e-thesis, e-books, and databases, respectively. The essence of considering the choice of digital preservation techniques are manifold. First is to guarantee the medium used for preservation of digital resources. Second is to guard against media deterioration or immediate obsolescence and, third to prevent loss of data. Therefore, digital preservation technique recognises the importance of digital data management and utilisation of technologies to conserve and diagnose burn.

Universities in Nigeria are established to provide solutions to topical problems, undertake researches, produce human resources with competent technical know-how and befitting workforce. The objectives of the establishment of universities is not limited to teaching, learning, research and community services because it is also looked upon for the advancement of science, technology, social, political and environmental well-being of a country. Libraries attached to universities, therefore, perform functions that are directly linked to the objectives of the universities and their research output. There are obvious challenges to effectively and efficiently operate university libraries. The challenges include changes as a result of modern era which brought with it technologies that oppose the traditional methods. Modern technology also changed the ways university libraries acquire, process, organise, disseminate, retrieve and more importantly preserve their collections.

Statement of Research Problem

University libraries are established to achieve the overall objective of university particularly to preserve and provide information resources to support research activities of academic staff. Information resources in digital format which can be accessed through access tools for users to meet their information needs so as to boost their research outputs, there are many factors that

influence research output of academic staff from one institution to other institution in Nigeria. Extant literature have reported instances such as the disposition of the academic staff to access and use of digital resources as influencing research output. Others reported that the effect of popular and indispensable roles of digital resources and skills required by academic staff to facilitate their access, retrieval and storage of digital resources for research purposes also influence research output.

The information in digital formats are, however unpredictable and dependent on use of electronic technologies to aid access, retrieval, storage and use of available information. These characteristics have been causing concerns to university libraries which are struggling to be at par with the changes and quick obsolescence of technologies as well as efficiently and effectively interface with patrons that are proficient with the use of these technologies. Preservation and conservation of digital resources depend to a large extent on preservation techniques and the access points generated to facilitate retrieval. To what extent do access to and retrieval of digital resources influence research output of academic staff of federal universities in Northern Nigeria? Therefore, this study is determined to investigate the influence of preservation techniques and access to digital resources on research output of academic staff in federal university libraries in Northern Nigeria.

Aim and Objectives of the Study

The aim of this study is to determine the influence of preservation techniques and access to digital resources on research outputs of academic staff in federal university libraries in Northern Nigeria. The specific objectives are to:

1. identify the types of digital resources used for research output in federal university libraries in Northern Nigeria;

2. ascertain the preservation techniques utilised for the conservation of digital resources for research output of academic staff in federal university libraries in Northern Nigeria;

3. determine the access tools that facilitated research output of academic staff in federal university libraries in Northern Nigeria.

Research Questions

The following research questions were asked.

1. What are the types of digital resources used for research output in federal university libraries in Northern Nigeria?

2. What are the preservation techniques utilised for the conservation of digital resources for research output of academic staff in federal university libraries in Northern Nigeria?

3. What are the access tools that facilitated research output of academic staff in federal university libraries in Northern Nigeria?

Review of Related Empirical Studies

Several studies have been reviewed in the area of preservation techniques, access to digital resources on research outputs of academic staff with focus on different segments particularly not of this collation of variables. The studies commonly revealed that for trending research output libraries resources contribute immensely when compared with what are currently obtainable as against two decades ago in Africa**.** Blanca's et.al (2011) reported that research output is an obvious evaluative indicator that continue to showcase the contribution of preservation and conservation efforts of the visibility of digital information resources.

Okafor (2011) carried out study to compare the research output of academics in science and engineering faculties in southern Nigeria using bibliometric analysis. Six objectives and two

hypotheses guided the study. Descriptive survey method was used for the study. Through stratified random sampling six federal universities were selected out of 13 for the study. Two hundred and ninety-one academic staff with the rank of lecturer II and above were used for the study. The research output considered in this study was counting of journal articles and supervision of postgraduate students. The study showed that University of Benin had the highest publication of all the universities but mainly in local journals. However, university of agriculture, Abeokuta had the highest articles in international journals, followed by University of Ibadan, Ibadan. University of Ibadan was the highest in masters and Ph.D. supervision followed by university of Benin. The study also showed that there is no significant difference between mean productivity of academics from different universities. However there is significant difference between mean productivity of articles published in international journals. It is then recommended the all stake-holders in research and education should create conducive working environment for researchers, through funding, providing the necessary equipment, necessary information materials by equipping the libraries. Also researchers should be sponsored to local, national and international conferences and workshops. This will expose the researchers in their field and enhance publishing within and outside Nigeria. The federal government should in collaboration with NUC establish databases as has been done in other countries. This will make it easier for studies of this type to be carried out in Nigeria.

Dare and Ikegune (2018) investigates the preservation and conservation of serials collection in selected academic libraries in Oyo State, Nigeria. Relevant literature on the concept of serials, importance of serials in academic library, preservation and conservation of serials, methods of preservation and conservation of serials, importance of preservation and conservation of serials, factors affecting the preservation and conservation of serials was reviewed. Seven objectives and

seven research questions guided the study, the descriptive research design of the survey type was adopted for this study. The study population consisted of two hundred and fifteen (215) library personnel in the three selected academic libraries. The population of the study consists of para-professional and professional librarians. Data were collected using questionnaire. Data collected, were analysed using simple percentages, mean and frequency distribution methods. The study provides answers to seven research questions posed. The result of the study revealed that the three libraries recruited more male staff than their female counterpart. It was revealed that journal, magazines and newspapers among others were the types of serial materials that are available and most frequently consulted; preserved and conserved in the selected academic libraries. The study also revealed that prone to vandalism, lack of knowledge and skills, theft and mutilation were reasons why serial materials are not available for use in the selected academic libraries. The study revealed that conditions for preserving and conserving serials were disallowing bags and coats into the serial section, maintaining vigilance and regular housekeeping among others. Microfilming, Fumigation exercise and Disaster preparedness were the major methods adopted to preserve serials. The study also revealed that the selected academic libraries have preservation and conservation policy and the measures put in place to contain emergency situation were provision of fire alarms and fire extinguisher. It was revealed that lack of preservation and conservation librarians in the library, insufficient fund, and lack of interest on the part of staff and inadequacy of equipment were the problems associated with the preservation and conservation of serials. Based on these findings, the following were recommended: Library management should organise a training programmes for their library personnel and send their staff for seminars and workshops on preservation and conservation of serials materials in order to be able to care for the serials collection in the library.

Ogunniyi and Adejubee (2014) investigated the strategies of curbing deterioration of library materials in selected colleges of education libraries in Southern Nigeria. Six objectives guided the study and two hypotheses, survey research method was adopted. Questionnaire was used to collect data from respondents, a total population of 13 academic librarians were used and the procedure for data analysis is descriptive statistical analysis. It was discovered that the most prominent incidences of deterioration were broken spine of projects, vandalism and mutilation of the projects. Furthermore, results showed that none of the college libraries has digitised the undergraduate projects. The study therefore recommends digitisation of projects in all colleges of education, provision of air condition and ventilation, cleaning and dusting of information resources, provision of photocopy machines, re-binding and microfilming

Adekannbi and Wahab (2015) investigated comparative analysis of the preservation and conservation techniques of selected special and academic libraries in Nigeria. Six research questions and three hypotheses guided the study. The population of the study comprises 20 librarians in all the selected libraries. Purposive sampling was adopted in selecting special and academic libraries and 20 libraries, seven (7) academic and thirteen (13) special libraries were used for the study. Questionnaire was used to collect data from respondents. The procedure for data analysis was descriptive analysis. The study found out the causes of deterioration in both special and academic libraries were dust, wear and tear, excessive photocopying, pests and excessive light, frequent use of material, magnetism and biological agents. The results further showed among others that both special academic libraries adopted cleaning and dusting, shelving to allow free flow of air, security systems, de acidification, technology preservation, refreshing and migration to preserve their information resources. It discovered further inadequate funding, lack of necessary facilities, inadequate manpower, in adequate of staff training and users and

security, autonomy and administrative lags, power as challenges to preservation and conservation techniques. Techniques have to do with some measures adopted by libraries to protect or prevent the entire library materials or collections from being harmed, damaged or deteriorated. The following are some of the techniques used for preservation of information resources in libraries: cleaning and dusting of information resources, photocopying, re-binding, microfilming, lamination, fumigation, shelving to allow free air flow, air conditioning and digitization.

Kwazo (2014) studied access to the use of library resources by sandwich diploma students of the College of Agriculture and Consumer Sciences, University of Ghana, Legon. Four objectives and three hypothesis are formulated for the study. Three hundred and twelve of the 312 students enrolled for the program. Research instrument used was questionnaires. The data was analysed using the SPSS version 16. The findings showed that about 74% of the students used campus library facilities when on campus. Majority (70.7%) used the college library more than any other library on campus. The main reason for using the library was to find a quiet place to study. This was followed by the use of the internet. The results further revealed that the students did not receive any library orientation or user education. As a result majority (59%) of the respondents found it difficult using the library. With regard to improving services they received, they stated provision of more computers, provision of user education, acquisition of more current books, and extension of opening hours in the evening. This study has shown that sandwich students of the University of Ghana, Legon, as place to study and also use the library resources and facilities. However, generally, they do not receive the necessary orientation to facilitate efficient use of the library facilities and resources. In addition, for lack of orientation, they did not have information on other libraries on campus and therefore depended mainly on the college library. Though most

students have adequate knowledge of ICTs which is a great asset, there were others requiring further exposure to enhance their use of available facilities. Four recommendations are made to enable them maximise access to information. (1)The co-ordinator (s) of the sandwich programme should liaise with the libraries to strategise on how to reach out to the students to enable them enjoy all the services that the traditional students enjoy. (2)College authorities should consider providing some little fund to motivate the library to extend the opening hours when the programme is in session. (3)The library system should sensitise the course Coordinator and chief administrators of all sandwich programmes about the importance of library user education and thus to factor this into their orientation programme for all first year students. Further, the library should be proactive and publicise its services to all students who come to the University of Ghana for any type of programme. (4)The library should also provide online services such as subject related gateway service that would benefit the sandwich students and other non-traditional students. The library should extend its opening hour' at least to 8.00 pm during weekdays when sandwich programmes are in session. These extra hours would greatly enhance the studies of sandwich students and help them achieve higher standards of performance.

Ogbodo (2011) examined the preservation of information sources in polytechnic libraries in South Eastern States of Nigeria. Four objectives and four research questions guided the study. The study adopted descriptive survey design and questionnaire was used as an instrument to collect data from the respondents. The population of the study comprises 33 academic librarians from polytechnic libraries in south east states. The study aimed at examining the preservation of information sources found out that the problem of preservation of information sources in the polytechnic libraries in South-East States of Nigeria are dust and disintegration of books and that the libraries did not adopt the use of modern technology. The methods that these polytechnic

libraries adopted in preserving their information sources are; repairs, use of firefighting equipment, binding, fumigation, air-conditioning, proper storage, and photocopy/duplication, use of insecticides and storage of books away from light modern technology were adopted. The constraints to preservation of information sources are; inadequate funding, harsh environmental condition, lack of good preservation policy and finally lack of competent manpower. The strategies for improvement of preservation of information sources are proper funding, planned housing/storage environment, capacity building formulation of preservation policy and insurance. Based on the above findings, it is recommended that: regular cleaning programmes should be designed for effective management of library materials; prompt binding and repairs of books that are disintegrating should be practised consistently; digital technology should be adopted for book preservation. Finally, library users should be adequately trained on proper handling of books and other library materials to enhance their productivity

Ozioko (2014) conducted a study on preservation and conservation of library resources in federal university libraries in South –East of Nigeria. Six objectives were adopted in the study. A descriptive survey research design was used for the study. The population of the study consisted of 93 academic librarians and 93 academic libraries comprised of the four University Libraries in South-East Zone were sampled. There was no need for sampling since the entire populations which are the 93 academic libraries in the four Federal Universities were used. Observation checklist, Questionnaire and Oral interview were used for data collection. 93 copies of questionnaire was distributed and collected, representing the 100% in analysing the data obtained, frequency counts, simple percentages, and mean (X) were used as statistical methods. The results obtained from the findings, revealed that various types of preservation and observation practices exist in University Libraries; that despite the preservation and conservation

practices available in there libraries; that library resources are deplorable in these libraries; that the academic Librarians agreed with factors necessitating these libraries in adopting preservation and conservation; that the academic librarians are merely satisfied with the extent under which preservation and conservation are applied to materials in these libraries; that there are some problems associated with preservation and conservation of library resources in these libraries; that many strategies were suggested by the academic librarians to enhance the preservation and conservation polices in these libraries. Based on the finding, it was recommended that these libraries should put into practice all the available preservation and conservation polices in their libraries; that regular power supply should be improved upon; sanctions among the librarians should be encouraged; tanning personnel of the library should be organized for the academic librarians; adequate funding and infrastructure should be given to the library users; proper cleaning and dusting as well as proper shelving of books should be given to library materials; eating in the library should be discouraged and regular fumigation of the library should be put into practice.

Mohammed et.al (2019) in their study investigated the problems of preservation and conservation of library digital resources in Federal University of Technology Minna and Ibrahim Badamasi Babangida University Lapai. Four research questions guided the study. The study adopted descriptive survey design and population of 74 professional and paraprofessional library staff from Federal University of Technology Minna and Ibrahim Badamasi Babangida University Lapai. The study used the entire population of professional and paraprofessional library staff and thus total enumeration was used. Seventy four (74) copies of the questionnaire were distributed sixty (60) copies filled and returned; representing a return rate of 81%. The data collected were analysed using percentages. The findings of the study revealed that library staff agreed that the

aim of preservation and conservation of digital information resources in the library is to prolong their lifespan, the library staff also agreed on the type of preservation and conservation techniques in used to digital information resources in the selected libraries and how those types helped in protecting the digital resources. Furthermore, the study revealed that majority of the library staff agreed that problems that militates against the preservation and conservation of digital information resources affects the lifespan of library materials negatively. The study also found that majority of the library staff agreed that possible strategies for effective preservation and conservation of digital information resources in the selected libraries should be developed in academic libraries in order to enhance preservation and conservation of digital library materials. The study thus recommended that libraries should be given allocation from the budget of the library, exclusively meant for preservation and conservation of digital information resources. The need for more qualified staff in the area of preservation and conservation of digital information resources in academic libraries should be a matter that needs urgent attention, there is need to educate library users on how to handle and use this modern information resources with care.

Saka (2013) conducted a conceptual and empirical study to determine the trends in the digitisation of thesis and dissertations in Nigeria universities. Literature searched revealed activities of digitization projects in university of Jos, Ahmadu Bello University, Zaria, University of Nigeria Nsukka, university of Ibadan. Mobile phone call on stakeholders to confirm whether or not the availability and use of software and accessibility to research works in these universities revealed that Ahmadu Bello University Zaria and University of Nigeria, Nsukka both uses D space software to digitize theses/dissertations and access to the digitised resources

was through respective web pages and university website as for Ahmadu Bello University Zaria while access to digitized resources was through institutions website Un.edu.ng respectively.

Saka, Abbas and Salmanu (2017) conducted a study to determine the management of research output in respect of undergraduate and postgraduate in university libraries in Kenya and Nigeria. Five research questions guided the study and contains variables such as; programme covered format of submission methods of processing, arrangement and organisation as well as methods of preserving and challenges involved in the management of research output. Survey research was used with six universities in the capital cities of Kenya and Nigeria and six university librarians respectively. Questionnaire was used as instrument for data collection. Sample tabulation and ticking appropriate boxes were methods of data analysis. Results showed that research output were acquired and submitted to university libraries by in both hard and softcopies. Preservation strategies were mostly through shelving and computerisation of collections. Major challenge to the management of research output was space**.**

Mohammed(2012) conducted a study on Impact of Information and Communication Technology Literacy, Record Storage, Maintenance Culture and Record Management Ability of Small business in Kaduna. Four research questions guided the study and two hypothesis. A survey research method was adopted and simple random sampling was used for the study and a population of (150).The descriptive method approach, identified four evaluation strategies to assess use and access of digital libraries; output assessment; which involves identification of the number of activities that patrons engage, such as the number of databases used to determine the usage of resources and services. Performance measures which evaluate the specific resources or services in terms of efficiency and effectiveness, such as the cost per item downloaded. Service

quality determines the overall quality of resources and services to meet the quality standard and outcomes assessment, determine the effects on patrons in terms of their benefits.

Danazumi et.al (2017) conducted a survey that showed the factors affecting teachers in Sabon gari local government secondary school Kaduna state making full use of digital information resources. Three research questions guided the study and questionnaire was used to collect data from the respondents. Simple random sampling was used and a population of 150 teachers. The study found out that used of digital information resources is complex such as method of use and cognition unfamiliarity with computer and networks, and lack of ability. In addition, many did not know what the library actually buys, while some older ones assume and think that the age factor is hindrance to use of digital information services and resources. When such users need digital sources, graduate students are used to search and help them. The study recommends library orientation and in-house training for teachers on how to search for information in libraries.

Abubakar (2016) conducted a study on methods of preservation and security of information resources in academic libraries in Niger State, Nigeria. Five research questions and five corresponding objectives were framed for the study. A case study design was adopted for the research. Purposive sampling technique was used to select 35 respondents from a population of 297 staff in all the twelve academic libraries in Niger State. Semi structured interview guides were used to collect data from respondents, while field notes guide were used to record data in respect of participants" observation. The data collected using individual interview guides and the field notes guides, which were properly completed, were presented and subjected to qualitative analysis. The steps followed in doing the analysis were documentation, conceptualization, coding and categorization, examining relationships and displaying data; and authenticating conclusions.

The findings revealed that the common methods of preservation of information resources in academic libraries in Niger State included repairs, binding and environmental control, whereas digitization and migration were not adopted. It also showed that periodic random checks on users and staff, scheduled patrols, and checking of users IDs, were all in use. Further, antivirus software and passwords were installed on computers of five libraries, while surveillance cameras were functional in only federal university of technology Minna library. Book theft, mutilation of information resources, non return of borrowed library materials, impersonation, and computer virus attacks were the prevalent threats in all the academic libraries in Niger State. The findings also showed that there were policies guiding the operations of the academic libraries in Niger State, but they do not have insurance covers. In respect of effectiveness of the methods in use, the findings showed that repairs, binding, environmental control, regular patrols, and identity cards verifications were effective in all the academic libraries, while computer virus protection / internet security xiii was effective in four libraries and Closed Circuit Television (CCTV) cameras in only federal university of technology Minna library. It was concluded that although academic libraries in Niger State have adopted good methods for preserving and was effective in four libraries and Closed Circuit Television (CCTV) cameras in only federal university of technology Minna library. It was concluded that although academic libraries in Niger State have adopted good methods for preserving and securing their information resources, and the fact that they paid more emphasis on printed materials, with less use of digital preservation methods and electronic security systems, it is obvious that the libraries are yet to embrace the opportunities offered by technological advancement for such activities. In view of the findings, recommendation were proffered that libraries should endeavour to have written policies on all aspects of preservation and security of information resources, upgrade and maintain facilities

such as binderies, air conditioning systems, fire prevention equipment etc including the adoption of digital preservation methods, while efforts should be made to reduce the incidence and effects of mutilation, book theft and non-return of borrowed materials through periodic repairs, enhanced security and adequate punishment for erring users, respectively. This research also recommended improvement of the manual methods of safeguarding library materials and adoption of electronic security system, while the antivirus software and CCTV cameras should be regularly updated and upgraded respectively.

Olatokon (2010) carried out a study to survey the preservation and conservation practices and techniques in Nigerian universities libraries. Three objectives and three research questions guided the study. A total enumeration technique was used for selecting 308 respondents for the study. The study used survey method and purposely selected 15 universities libraries and a semi structured questionnaire was used to collect data for the study. The data collected were analysed using the Statistical Package for conservation techniques adopted by the libraries which were not affected. Findings revealed that preservation and conservation techniques, though adopted in the university libraries were not effectively in use although the libraries all have preservation polices. The study also revealed that cleaning and dusting of library materials is the most commonly used technique. The study established that there are indeed incidences of deterioration the most prominent results being books becoming torn and cracking and scratching. Further results showed that though some of the libraries adopt and use some digital Preservation techniques, they are still not effectively used. Other findings revealed that inadequate funding was the most severe inhibitor to effective preservation and conservation activities in the university libraries. Based on the findings, recommendations were made towards improving preservation and conservation Practices in the libraries.

Ovowoh and Iwhiwhu (2010) also investigated the preservation and conservation of library materials in higher institution libraries in Nigeria. Three research questions guided the study. The study adopted descriptive survey design, the population cover Delta State University Abaraka library and Petroleum Training Institute Effurun library staff with a total number of 50 staff. Questionnaire, observation list and interview was used to collect data from the respondents and simple random sampling was used to select the respondents. The study revealed that there was no written policy in the institutions studied, and decisions on preservation and conservation were arbitrary and inconsistent. Further, the findings revealed that all respondents confirmed that there was need to have such a policy and that the policy should spell out the percentage of the 6 budget to be used for preservation and conservation programme. The findings also showed that there were no personnel trained in preservation and conservation of library materials, but all the libraries accepted that non-professionals had received some training in general librarianship.

Jimada (2015) investigated preservation of digital information resources in federal university libraries in north western states of Nigeria. To achieve the objective of the study, four research questions were constructed. A qualitative research methodology was used; purposive sampling was used for the study, the instrument used for data collection was the structured questionnaire and interview. The responses from the respondents who are staff of the digitization unit were analysed descriptively using tables. The result of the findings showed that the most popular information resources generated and preserved are theses dissertation, preprint and post print journals. External hard drives, CD-ROM/DVD and computer hard disk are the common storage media used for preservation in the libraries studied. It was also discovered that migration and use of standard are the popular strategies used for preservation. The study discovered that the major challenges in preservation of digital information resources include; lack of infrastructure,

technological obsolescence, poor maintenance culture, inadequate power supply and inadequate fund. The study concludes that even though some form of preservation is carried out on digital information resources in libraries studied but yet not effectively and efficiently done. In view of this a number of recommendations were made including providing different types of digital information resources such as record inventions, technical report, use of mirror server, use of strategies such as emulation, refreshment, constant upgrades of hardware and software.

Shameenda (2011) investigated preservation and conservation of library materials, techniques and practices in the University of Zambia Library and its two branches. Five research questions guided the study. The study highlighted preservation and conservation issues which included managerial and financial considerations including storage and accommodation, staffing levels, policies, techniques and practices in preserving and conserving library materials and the information contained in them in order to ensure long term access to them. Survey research method was adopted for the study and the population of study were 35 library staff, 6 bindery staff and 11 faculty academic staff total 55. Questionnaire, observation lists, interview and documentary sources were used as instrument for data collection. Purposive sampling was used for this study. The research findings revealed that although the University of Zambia libraries were involved in the long-term preservation of library materials, they did not provide a well-planned preservation and conservation care because preservation 7 was given least priority and conservation programmes were addressed in varying degrees in the libraries. The study further identified lack of preservation and conservation planning, policies and weak commitment from the University of Zambia management on funding of libraries at the University of Zambia. Also inadequate programmes and limited preservation and conservation education and training among

librarians were the other forms of obstacles to effective preservation and conservation of library materials in the university libraries. Further results showed the lack of awareness concerning preventive preservation measures, poor handling and use of library materials.

Musa and Shittu (2012) examined digitisation of library resources in Kashim Ibrahim Library: process challenges and impact of the services using documentary research method and oral interview in gathering data. Five research questions guided the study, the method adopted for the study is documentary research method using interview as an instrument for data collection, a web search was conducted, and information was also gathered by observation and work experience from the researcher who have been a part of the digitalisation exercise. The study discovered copyright issues, difficulty in digitizing some materials, constant changing hardware and software, lack of lenses, virus attacks, and unavailability of needed materials, technical support and security. Based on the findings, recommendations were proffered. These includes migration, emulation, encapsulation, use of anti-virus, constant upgrading of software with backup before each upgrade, staff should be deployed for checking of CD before submitting and the use of digital camera and photocopy software should be encouraged, workflow time should be reduce and lastly, advocacy and submission of preprint should be encouraged by library.

Njeze and James (2013) investigated capacity building initiatives in preservation techniques with reference to Nigerian Universities. The researcher randomly selected four universities libraries and used descriptive method, using self-developed questionnaire. The respondents in the study comprised librarians and non-librarians, a total of 120 copies of questionnaires were administered, but a 112 copies were retrieved and analysed. The study revealed that the universities in Nigeria are not exposed to capacity building in preservation. The study

recommended regular trainings and re-training for the development of all staff and for any university to stand out amongst others.

Ndakalu (2014) conducted a study on access and utilisation of digital information services in academic libraries, a case study of University of Nairobi. The aim of the study was to assess the extent of access and utilization of digital information services in academic libraries in Kenya with reference to University of Nairobi Library. The objectives of the study were to assess access and utilisation of digital information resources in the University of Nairobi library, establish the level of awareness of digital information services in that library, identify the challenges facing the library users in relation to access and utilisation of digital information services in the library and suggest possible solutions to the identified problems in the library. The study used descriptive survey design where the target population comprised 96 postgraduate students of the University of Nairobi. Purposive sampling technique was applied to the study and questionnaire was used as the instrument for data collection. The findings of the study showed that the majority of the respondents rarely approached the librarians for assistance in the library and the majority of them were not aware of digital information services. The major challenges the library users faced while accessing and using of digital information were lack of adequate information skills, lack of awareness, training and poor information infrastructure. Recommendations were made to include the following: provision of Internet facilities, regular library orientation for both staff and students, training of library staff on ICT skills and provision of power supply.

Osunrinde and Adetunla (2016) studied the Preservation and Conservation Practices in university libraries in South-West, Nigeria. Five research questions guided the study. The study adopted a descriptive survey design. A total enumeration technique was used for selecting 308 respondents for the study. Questionnaire was used for data collection and was analysed using descriptive

statistics. The findings revealed that library security is the most used measure of preservation and conservation practices. Dust and particulate matter are the greatest causes of deterioration to library materials. The finding further revealed that dusting, cleaning and proper shelving are the major techniques adopted by the libraries. The study concluded that lack of proper preservation and conservation practices in the universities are the cause of resource loss and deterioration. Therefore, the study recommended that libraries should deploy modern preservation and conservation tools such as technologically enabled ICT devices which will aid adequate storage and enhance the durability and longevity of information materials in the libraries.

Irene (2016) conducted a study on digital preservation and institutional repositories; case study of Universities in Kenye. The study was conducted at the University of Kwazulu Natal in 2016. The study investigated the strategies used by universities in Kenye for the preservation of their scholarly contents was the first of its kind. The survey method was used within multiple case study design. Data was collected using questionnaires administered to 350 postgraduate students conveniently selected from six universities in Kenye. Personal interview was used to collect data from the university libraries in these six universities. The findings from the study revealed that the scholars in these universities were personally engaged in preservation of their digital information but did not extensively use university digital archives, servers or repositories. This was largely attributed to lack of awareness of the important role of digital preservation. The study recommended that even with the existence of institutional repositions, much was needed to be done to create more awareness and acceptance of digital repositories.

In a research work conducted by Dada (2016) to assess the preservation of information resources in Federal College of Education (FCE) Zaria, three research questions guided the study Data collected were analysed using frequency, percentage and cumulative mean .It was revealed that

textbooks and e-resources were the most available information resources. Four-point rating scale was used to obtain responses from staff of preservation unit of the library. The study found that improper ventilation, poor network, not knowing how to search items and wrong shelving are among the causes of deterioration of library materials in Federal College of Education Library, Zaria. Barriers to effective preservation of information resources in the College Library included lack of suitable or inadequate equipment and lack of knowledge of preservation on the part of librarians. Recommendations were proffered on the need for good ventilation and an enabling atmosphere, provision of power supply, training of library staff on ICT skills and preservation techniques practice.

Kavishe (2016) carried out a study on investigation of the preservation skills and strategies being used by the University of KwaZulu-Natal libraries in preserving electronic information resources (EIRs) to ensure their long term availability and access. Five research questions guided the study and a population of 60 library staff was adopted for the study. Respondents are engaged through a census sampling technique and instrument for data collection is self- administered questionnaire comprising closed and open questions. A quantitative approach using the survey research design is used. Data is analysed using Statistical package for the Social Sciences version 20. The analysis of the results reveals that there is intermediated level of ICT knowledge and skills regarding preservation of EIRs amongst respondents. The results also reveal that the respondents need trainings in migration, metadata and emulation techniques. It is believed that the study will assist the library staff on what areas to be improved in the EIRs management. The study recommended that useful research information can help the University libraries involved the study to properly preserve EIRs for optimal benefits of its users. Other universities in related

situations can also benefit from the research findings and emphasised the need for training of library staff on ICT skills/ preservation of electronic information resources.

Kulhary *et.al* (2017) equally carried out a study on digital preservation and access of various resource document. A case study of current status of North American University. The study adopted content analysis method to assess the level of digitisation preservation of natural resources documents. It is important to present the status of the digitations process for natural resources and to advocate for increased collections of digital material for ease of reference and exchange of information. Digital collections need to include both published documents and ancillary material for research projects and data for future use and interpretation. The methods in this study can be applied to other natural resource collections increasing their use and distribution. The process of decision making for documents and their preservation and inclusion in Scholar Works is presented as a part of the Forest Sciences Commons as a subset of the Life Sciences Commons of the Digital Commons Open Network launched and maintained by is press. Digitization has increased the roles and skill sets needed for librarians and from libraries. This creates new challenges and opportunities for the library as publisher and as an advocate for open access. Digital curation melds together digitization and knowledge management and enhances community engagement. Digitization of collections are reviewed and natural resource documentation presented for faculty publications, Research Projects and Centres, eBooks, Journals, Galleries and electronic Theses and Dissertations (ETDs). Recommendations are made to increase the digital curation of the collection by encouraging community participation and use. Digital archives are important to natural resource professionals as society-ready natural resource graduates need to deal effectively with complex ecological, economic and social issues of current natural resources management. Natural resource research for the future needs to ensure that

professionals have a greater breath of knowledge as they interpret and apply new knowledge, understanding, and technology to complex, trans-disciplinary social and biological issues and challenges.

In a related study, Kay et al (2017) investigated the backup digital preservation practice with empirical research. The study introduces the National Library of Australians digital preservation knowledge base, which helps library to manage digital objects from its collections over a long term. The knowledge base information which format rendering software, operating systems, hardware and most importantly, the relationships between them were discussed. Most of the works on the knowledge base over the last few years have been focused on the mapping of functional relationships between file formats, their versions and software applications. The information is gathered through unique empirical research and initially recorded in multiple worksheet excel file in semi – structured format, through the development of a prototype graph data base. The study recommended that even though most libraries have their backup, there is a need for more external backup due to erratic power supply and virus attacks.

Methodology

Descriptive survey design was used and population consisted of 12,691 academic staff with a breakdown of 161 ICT librarians and 12,530 lecturers in 22 federal universities in Northern Nigeria. Multi-stage sampling technique was used to select nine (9) universities, using stratified sampling technique while proportionate stratified sampling was used to select 377 lecturers and 79 ICT librarians. Thus, Otaha (2015) view multi-stage sampling as sampling that consisted of processes, stages, and sampling techniques to arrive at reasonable and appropriate sample size. The researcher used two sets of questionnaire to collect quantitative data and response rate was 386 made up of 321 lecturers and 65 librarians in ICT Units in nine federal universities in

Northern Nigeria. Objective1 was on types of digital resources used to disseminate research outputs and divided into two parts in the questionnaire items. The first part was to elicit responses from librarians in ICT units on types of digital research output used for research output while the second part was to elicit responses from lecturers on the extent of use of digital materials for research output. Objectives 2 and 3 were designed in the questionnaire items to elicit responses from librarians in ICT unit on the preservation technique utilised for conversion of digital resources and type of access tools utilised by lecturers that facilitates research output. Mean and standard deviation and of course descriptive statistics were used to analyse data. The list of the responding universities are shown in Table 1

Table 1: List of Universities Studied, and Number of Lecturers and Librarians in ICT unit in Northern Nigeria

University	Lecturers		Librarians in ICT unit		Total		
	N / A	N / R	N / A	N / R	N / A	N / R	%
A B U, Zaria.	65	58	16	14	81	72	88.9
B U K, Kano.	55	46	10	8	65	54	83.1
University of Jos.	40	33	10	6	50	39	78.0
F UT, Minna.	25	22	12	10	37	32	86.5
UNIMAID, Maiduguri	30	27	6	5	36	32	88.9
A T B U, Bauchi.	25	21	4	4	29	25	86.2
U D U, Sokoto.	60	44	8	7	68	51	75.0
Fed. Univ. of Agric., Makurdi,	27	26	7	6	34	32	94.1
Modibbo Adama University Tech, Yola.	50	44	6	5	56	49	87.5
Total	**377**	321	**79**	65	**456**	**386**	**84.6**

N/A = Number Administered and N/R = Number Retrieved

Presentation of data

Objective 1: Types of digital resources used to disseminate research output by academic staff in federal university libraries

The digital resources that are used to disseminate research output by academic staff depended on types of these resources. The digital resources used for the dissemination of research output contributed to the understanding of their peculiarities. This is why the thrust in this was determined to assess the first specific objective and provide answer to the first research question which is: "*What are the types of digital resources used for research output by academic staff in federal university libraries in Northern Nigeria?.*" The types of digital resources identified comprised e-books, e-journal, e-conference papers and e-magazine/newspaper articles, e-chapters in books, e-theses and e-dissertations. This was established by the respondents (lecturers and librarians in ICT unit). The expressed opinions are presented in Table 2 and 3.

Table 2: Types of digital resources used by librarians in ICT unit for research output in federal university libraries in Northern Nigeria

Sn	Digital resources	SA 4	A 3	D 2	SD 1	Mean	Std Dev	Decision
1	e-books/ chapters in books	26	35	2	2	3.31	0.683	Affirmed
2	e-thesis and e-dissertations	19	31	4	11	2.89	1.017	Affirmed
3	e-journal articles.	35	24	3	3	3.40	0.787	Affirmed
4	e-conference paper/seminars/work shops:	28	27	3	7	3.17	0.945	Affirmed
5	e-technical reports	16	23	9	17	2.58	1.130	Affirmed
Weighted mean						**3.07**	**0.6**	

(Decision mean = 2.50)

From Table 2, it was discovered that all items meet the criterion 2.50 benchmark revealing all of them have positive impact on research output with the highest mean value from e-journal articles with 3.40 mean showing the importance of journals in terms of current happening in ones field as they convey research findings. Lowest mean score was discovered from e-technical reports with 2.58 mean value as they are e-resources emanating from specialised fields. E-journal articles tend to have mean score higher than other research output because e- journal convey current and reliable information which are mostly empirical works.

Table 3 shows the opinions of lecturers on types of digital resources used to disseminate research output.

Table 3: Extent of use of digital resources for research output in federal university libraries in Northern Nigeria

Sn	Digital resources	VHE 4	HE 3	LE 2	VLE 1	Mean	Std. Dev.	Decision
1	e-thesis/dissertation	99	155	53	14	3.1	0.80	Affirmed
2	e-journal	138	139	38	6	3.3	0.74	Affirmed
3	e-books	95	148	63	15	3.0	0.83	Affirmed
4	e-reference materials	69	163	74	15	2.9	0.79	Affirmed
5	e-Conference papers	64	156	82	19	2.8	0.81	Affirmed
6	e-magazines/monographs	40	103	143	35	2.5	0.85	Affirmed
7	e-technical reports	34	117	113	57	2.4	0.90	Disaffirmed
8	Databases	103	12	67	23	3.0	0.90	Affirmed

Weighed mean	**2.9**	**0.59**

(Decision mean = 2.50)

With the exception of e-technical report with 2.4 mean value less than the benchmark, all the other digital resources meet the criterion of 2.50 benchmark. The responses of the lecturers confirmed that digital resources used impact research output. In the table, such digital resources used to disseminate research output because they are included in their order of ranking with their respective mean scores comprising e-journal with 138 VHE (3.3), being the top list because of its dominant role in conveying latest research findings.

Objective 2: Preservation techniques utilised for the conservation of digital resources

Identification of the preservation techniques utilised for the conservation of digital resources adopted by federal university libraries in Northern Nigeria is given in second research question along with the second specific objective of the study. Preservation and conservation of library materials both print and non print are meant for upkeep of materials for future use. Preservation deal with regular maintenance aspect whereas conservation deal with the remedial treatment and restoration of already damage resources. Preservation techniques are distinguished set of processes that ensure long-time conservation of information resources. Preservation is done to ensure that conservation meets standard, a well preserved resources increases the life-span of a conserve resources. Conservation is deliberated on items that have value. Their responses to the items used for the second research question: *What preservation techniques are utilised for the conservation of digital resources to enhance use by academic staff for the purposes of research output in federal university libraries in Northern Nigeria?* The opinions of the respondents are tabulated in frequencies and percentages in Table 4 along with their respective means and standard deviations. Decision on whether the preservation techniques is adopted or not is based

on a benchmark mean of 2.50. Mean score of lower magnitude would indicate that such preservation techniques was not universally adopted.

Table 4: Preservation techniques utilised for the conservation of digital resources to enhance use by academic staff in the federal university libraries

Sn	Preservation techniques	SA 4	A 3	D 2	SD 1	Mean	Std	Decision
1	Encapsulation has helped the library group subject fields accordingly.	16	17	16	16	2.51	1.01	Affirmed
2	Refreshing has based the transfer of information from one medium to another.	14	22	13	16	2.52	0.02	Affirmed
3	Technology preservation has help the library recovered damaged information sources.	14	33	7	11	2.77	0.27	Affirmed
4	Information Emulation has helps the library take cognisance of software and hardware requirement.	18	16	15	16	2.55	0.05	Affirmed
5	Information Migration has helped the library change resource format to ensure access.	14	31	8	12	2.72	0.22	Affirmed
6	Digitisation has help the library change print to electronic resources	23	35	2	5	3.17	0.67	Affirmed
7	Replication has aided the addition of new access point.	12	26	12	15	2.54	0.04	Affirmed
Weighted mean						**2.71**	**0.21**	

(Decision mean = 2.50)

In an ordered or hierarchical impact, use of digitisation ranked the most used digital resource for facilitating research output by the academic staff in the federal university libraries involved in the study. This is indicated that 23 and 35 of the librarians in ICT units strongly agreed and agreed respectively with the use of digitisation. The mean score for the item (3) was 2.77. Next in the order were information migration which 14 and 31 of the librarians strongly agreed and agreed was used with a mean score of 2.72. Others which the librarians said were of impact were information emulation (2.55), replication (2.54), refreshing (2.52) and encapsulation (2.51), respectively. From the mean scores, almost all the librarian in ICT units were in agreement that

the listed digital resources were used to facilitate research outputs in the selected Federal University libraries. With a weighed mean score of 2.71 and a standard deviation of 0.21, it could be said that the librarians used the listed digital resources for the facilitation of research outputs by academics in the university libraries. However digitisation was consider as the most popular preservation techniques.

Objective 3 Access tools that facilitates research output for lecturers in federal university libraries in Northern Nigeria.

Access to information resources is great to the utilisation of any information resources. The lecturers in federal university libraries in Nigeria are using different types of access tools in accessing information for their research output. According to the third specific objective and third research question. *What are the access tools that facilitate research output of lecturers in federal university libraries in Northern Nigeria?* The responses of lecturers is tabulated in Table 5.

Table 5: Access tools used by lecturers to facilitate research output in federal university in Northern Nigeria

S/N Access Tools	SA 4	A 3	D 2	SD 1	Mean	Std. Dev.	Decision
1. Bibliographies make it easy for researcher to find out more about topic area in research.	7	34	11	13	2.54	60.4	Affirmed
2. Abstracts aided user with fully description of item	15	28	12	10	2.74	0.2	Affirmed
3. Catalogues assist user to locate books and other materials available in the library.	22	27	10	6	3.00	0.50	Affirmed
4. Index provide user with clear description of items in the library.	11	36	7	13	2.69	0.19	Affirmed
5. Database enable user to search for relevant information.	14	25	13	10	2.77	0.21	Affirmed
6. Finding aids help user to find information on a specific	11	25	17	12	2.54	0.04	Affirmed

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group, collection or series of archival collection.		
	2.67	**0.17**

(Decision mean = 2.50)

All the mean value on the table have gone beyond the criterion 2.50 benchmark showing that all the access tools are being utilised by lecturers for their research output through varying mean value and degree .The responses of the lecturers in Table 5 affirmed the use of access point with catalogues having the highest mean score of 3.00, followed by databases with 2.77, abstract 2.74, indexes 2.69, bibliographies and finding aids having the same mean score of 2.54. The weighted mean score of 2.67 support the views of the lecturers that the use of access tools facilitated the research outputs of the users in the selected federal universities in Northern Nigeria. The use of catalogues might not be unconnected with the fact that it is easier and more familiar to library users in accessing or searching information.

Summary of Major Findings

The major findings from the study are summarized below:

1. The types of digital resources used for research output on which the preserved digital resources impact positive influence were journals, thesis/dissertation and conferences though e-journal top the list.

2. Digitisation was considered as the major and popular technique adopted to preserve digital resources in the surveyed university libraries in Northern Nigeria.

3. The types of access tools used by academic staff to facilitate research output were databases, catalogues, bibliographies, finding aids, indexing and abstracting with catalogue being the top list.

Discussion of the Findings

Research question 1: What are the types of digital resources used for research output by academic staff in federal university libraries in Northern Nigeria? The type of digital resources used by lecturers and librarians in ICT unit that are cited in their research output showed the influence of consulting such resources. E-Journal articles were most consulted and used digital resources during publication and presentation by lecturers and librarians in ICT unit respectively no wonder journal contain empirical works and current information in one's field. The finding agrees with the finding of Ndakalu (2014) who reported that journal, conferences and seminars are the most preferred channels and consulted of research output in universities because they always convey current information which are mostly empirical.

Research question 2: What preservation techniques are utilised for the conservation of digital resources for research output of academic staff in the federal university libraries in Northern Nigeria?

The result of the analysis on preservation techniques to digital resources revealed that encapsulation, refreshing, replication, information emulation and information migration are the preservation techniques though digitisation was the popular preservation technique adopted by ICT librarians in the university libraries studied this is because digitisation is the most popular preservation techniques used by the selected academic libraries based on the finding to digitise their resources. Digitalisation is a modern trend in librarianship. This findings contradict the finding of Saka, Abbas and Salman (2017) as the authors reported that research output acquired were s submitted to university libraries of Nigeria and Kenya in both hard and softcopies and were preserved through shelving and computerisation.

Research question 3: What are the access tools that facilitate research output of lecturers in federal university libraries in Northern Nigeria?

The types of access tools used by lecturers to facilitate their research output revealed that catalogues, bibliographies, databases, finding aids, indexing and abstracting were the most utilise tools for accessing information resources in the selected university libraries study. This is because access tools serve as gateway to any library collection and they are the most utilised tools that aided in locating information resources in library because they are cheaper and popular. This finding is in line with finding of Ezekwe and Muokebe (2012) as the authors reported that access tools could be seen as information location aids that are used to identify what a library has in stock for use.

Conclusion

The study concluded that e-journal article serve as plat form for convening current research findings and that digitization is the modern method of preserving paper- based materials in libraries. Easy access to information resources is made possible through library catalogue.

Recommendations

Based on the major findings of the study the following recommendations are hereby put forward and that the management of universities in Northern Nigeria should ensure that;

1. Academic staff be encouraged /motivate to write and patronized other digiral resources such as e-thesis/dissertation, e-text book, e-technical reports, etc. research output should not only be disseminated but also create and preserved the research output in the institutional digital repository.

2. Federal university libraries be encouraged to introduce and adopt other preservation techniques to digital resources.

3. Access to digital resources in federal university libraries be extended to other access tools such as bibliographies, abstracts, indexes, etc.

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