

ACCESS TO DIGITAL MATERIALS ON RESEARCH OUTPUT: EXPERIENCE OF FEDERAL UNIVERSITY LIBRARIES USERS IN NORTHERN STATES OF NIGERIA

by

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Abstract

This study examined access to digital materials on research output in some selected federal university libraries users in northern Nigeria. To achieve the goals, three objectives guided the study. Quantitative method and survey design were adopted to elicit data from lecturers and ICT librarians using close-ended questionnaire. A multi-stage sampling technique was used in selecting respondents from each institution. The data collected were analysed descriptively and the results were presented using frequency counts, mean and aggregate mean scores in tables. The findings revealed that access to digital materials influenced research output of library users with particularly to number of journal articles, conference papers presented, books, and chapters in books published. The choice of metadata type is determined by the number of modules such as administrative, technical, and preservation so as to resolve militating technical factors, promote information availability, interactive nature of technology, and portability of digital content. It could be concluded that access to digital materials and use immensely contributed to research output and metadata types, technical factors moderate access, adoption, use and research output in the selected federal universities in northern Nigeria. It is recommended that access and use of digital materials be prioritised for service effectiveness and efficiency on digital platforms supported by the libraries in the zone. Choice of metadata types should be based on possessing modules that support administrative, structural, technical, transformative procedures and preservation.

Keywords: Access; Digital materials; Research output; Experience; Federal University ; Library users; Northern Nigeria.

Introduction

The facilitating role of any university library is to support with information resources for teaching, research and community information needs. This implies that the library is a platform that support the representation of dully articulated, understood and documented that sprout as a result of activities such as teaching and research engagements. These carefully, published documents detail come as well organised resources that substantially add to knowledge. Research output is characterised the same, and made up of two distinct words “research” and “output” – as a process and product. Ibrahim (2013) defined research as studious inquiry or systematic investigation of some phenomenon or series of phenomena by experimental method in order to discover facts, to establish or reverse a theory, or to develop a plan of action based on the facts discovered. This implies that research purpose is output that affects societal development and

improvement. It is a way of acquiring functional, dependable and useful information and data about the particular object of research. Ochia and Omofonmwan (2013) while stressing the perceive importance of research output, stated that, research output has impact that transcends all spheres of human endeavour- social, economic, political, educational, science and technology. It provide outcomes that serves as determinants that pace growth and development of particular sphere of the society.

Research output is usually affiliated to traceable individual, university, country or institution. Conceptually, it could be defined as the number of publications that serve as a yardstick for measuring the quality, quantity and performance ascribed to an individual, institution, industry and organisation over a period of times. Universities are ranked on the basis of their researches/research output. Research outputs effort helps to solve professional problems, develop tools and methods for analysis of organizations, services and behaviour. Its ultimate benefit lies not only in the generation of new knowledge but in the translation of such knowledge into technologies, interventions and strategies that effectively and appropriately delivered to the needy (Ugwuona & Dike, 2015). Research output are delivered in numerous forms and formats of which the paper bases are now replaced with digital material.

Digital materials easily make visible and a pedestal for increased information access. The quest for digital materials could also be attributable to its ease of use, support for technological inclusion, popularity among scholars and publishers as well as supported by multiple interfaces that could support active participation of stakeholders independently, and not infringing on access, retrieval and storage. Therefore, digitisation of information resources by university libraries affects library users such as students, researchers and lecturers quality and quantity of research output. It disposes these users to both local and international contents, promotes and broaden such contributions to the scholarship universe. Digitisation of information resources departs from the traditional methods of preserving collection in libraries particularly those in the organic form because they are pruned to deterioration through biological pollutants, in addition to wear and tear through constant usage and users mishandling (Dada, 2016). The library promotes utilitarianism of acquired, organised and stored information resource; which is a proponent of access that digital materials make instant, serving multiple users at the same time and open to ability to exploit.

Digital information resources exist as e-resources - databases, journals, newspapers, theses, conferences, dissertations, technical reports and research papers in digital format (IGI -

Global Disseminators of Knowledge, 2017). These information resources are available in electronic formats and could be in bibliographic and full text databases (Abubakar & Saka, 2006). Another dimension reiterates the different formats these materials exist particularly with the inception and adoption of information and communication technologies for effective and efficient service delivery, and necessitate making informed choices to address the challenges of technological development. This can be done by proffering systematic procedures for evaluation, subscription and safeguarding against uncertain quality and contributing local content by expanding institutional information repositories to support and facilitate other scholars.

Accessing digital materials is very pertinent to libraries, archives, and museums because their mandate includes making the resources available and accessible in the future. Conditions abound that must be addressed, particularly knowing the exact file format is crucial as well as copyright, ethical and other legal obligations. A robust metadata helps tremendously in facilitating access and choice of digital software utilization. Metadata apart from describing, storing, it also elaborates how such resources were acquired and captured format resources are born which remained a prerequisite for the selection of preservation technique in the digital realm. Therefore, to be able to effectively and efficiently utilize digital materials goes beyond awareness expressed in some quotas, but harmonizing the challenges caused by lack of homogeneity of processes embedding standardisation.

The study covered all lecturers and librarians in the following federal universities: namely (i) Ahmadu Bello University Zaria, (ii) Bayero University Kano, (iii) University of Maiduguri, (iv) Modibbo Adama University Yola, (v) University of Jos, (vi) University of Abuja, (vii) Federal University Lokoja, (viii) Federal University Lafia, (ix) Federal University of Technology Minna, (x) Federal University Dutsin-ma, (xi) Federal University Gusau, (xii) Federal University Dutse, (xiii) Federal University Kalgo, (xiv) Usman Danfodio University, Sokoto, (xv) Federal University Kashere, (xviii) Abubakar Tafawa Balewa University Bauchi, (xvii) Federal University Wukari, (xviii) Federal University Gashua, (xiv) Federal University of Agriculture Makurdi, (xx) Nigerian Defence Academy, Kaduna, (xxi) Police Academy, Wudil, Kano and (xxii) and University of Ilorin all in Northern Nigeria.

The librarians of the university libraries were purposively selected with the assumption that they use and publish their works, upload the university local contents and facilitate users to access numerous types of research output to improve theirs, whereas lecturers are to evaluate the

contributory role their respective libraries as they make visible digital materials that are accessible and used for numerous output.

Statement of the Problem

Digital platforms are very popular and used for uploading and downloading digital materials. Concern of the study is to know the extent to which access to digital materials housed in libraries in Northern Nigeria contribute to research output of users. The libraries facilitate and support with information resources and their respective couriers. Continuous use, access and retrieval are mitigated by challenges affecting the contributions of these resources to research output. The need to investigate applicable access to digital resources and its influence on research output as it affect federal university libraries in Northern Nigeria cannot be overemphasized. Preliminary investigation by the researcher revealed that academic staff using university libraries face challenges in accessing the digital materials and to some cases these categories of materials are not well preserved by digital means. All these shortcomings affect not only the duration of access to digital materials but also their research output. The study therefore seeks to find out the access activities designed so as to support continuous limitless to research output of ICT librarians and lecturers of Federal University Libraries in Northern Nigeria.

Objectives

1. Determine the contribution of digital materials to research output of users at Federal University Libraries in Northern states of Nigeria.
2. Examine the extent metadata composition promotes usability of digital materials in Federal University Libraries in Northern states of Nigeria.
3. Determine the technical factors militating against the exploration of digital contents contributions to research output in Federal University Libraries in Northern Nigeria.

Literature Review

The literature was review base on the following sub-heading:

- Contribution of Digital Materials to Research Output
- Extent Metadata Composition Promotes Usability of Digital Materials
- Technical Factors Militating the Use of Digital Materials in University Libraries

Contribution of Digital Materials to Research Output

Digital technology which is the platform on which digital materials are put to use has brought significant improvement in the ways libraries capture, store, preserve and provide access to electronic information resources. It offers important reformatting advantages over the

traditional methods, and also create higher quality reproduction of deteriorating original that contribute to the shaping of thought, guiding the narrative as well as supplying appropriate methodologies; research design, method, procedure for data collection, and data analysis. Digital technologies have facilitated the reproduction of digital images over and over again with no loss of image quality, and greatly influence research output and distribution, and potential cost savings associated with storage and distribution (Oyedun, Sanni, & Udoakang, 2014). These are among several attributes that digital material resources significantly influence and contribute to research output.

Research output of users of digital material resources became norm with the turn of the 21st Century, others affected are publishers also are increasingly adopting the production and circulation of electronic resources in diverse formats (Bailey & LaCalle, 2016). Scholars are also not left with the struggle to be seen in the digital space, particularly the web as many scholars are ranked based on the number of visible research output and the number of other scholars who appreciate their efforts by citing them. This research output metric shows a deserving level of accomplishments and productiveness in the academic and industries. Both academics and industries are focused on effective and efficient dissemination of information that may be attributable to why they encourage the platform. Particularly because digital materials when embedded into electronic service delivery are accessible and utilized without such barriers such as time and geography, and bridges the information gap affecting growth, unnecessary duplications and waste of resources as a result of ignorance that such effort has been expended earlier (Aina, 2013).

The contribution of digital materials to research output can be amplified by conceptualising the attributes of research. Ocholla, Ocholla and Onyanacha (2012) defined research to be a way of finding answers to unknown problems emerging from natural and artificial phenomena, within our environment, through a systematic, logical and verifiable process. On a more practical basis, research is done to fulfil learning, domestic and career needs; to satisfy curiosity; for egoistic reasons, such as recognition and visibility; for career related rewards, such as promotion, securing tenure or permanent appointment; and for self-development or growth, among others. The significance of research in the academia is that it enables academics to share insight, demonstrate academic scholarship and gain recognition for creative thinking. Therefore, research plays an important role in the society. It is authoritatively reported that the quality of any institution such as universities is measured by the amount of

researches it produces. These research output is specific and helps to solve societal problems, professional problems, and help to develop tools and appropriate methods that can be easily used for the analysis of facts. It also influences the organisations, arrangement, guide services delivery and procedure for the conduct of research and behaviour.

Stakeholders who find the use of digital materials have been itemized by Gbaje (2012) to include students and faculty members. They increasingly demand and prefer digital sources because of its ease to access, retrieval from numerous browsing platforms that make delivery systems of sort for information almost immediately. Import to note is that digital materials help to meet the information needs of users by helping them to build concepts, literature, empirical and methodologies that eventually influence the literary outcome of research output. For instance, Opeke and Odunlade (2011) report that science and technology teachers rely on digital resources such as datasets, disciplinary repositories, conference papers, journal articles and technical reports for their own works. The implication is that, the prerogative for digital material use is with the research and the contributions such research output make to knowledge.

Extent Metadata Composition Promotes Usability of Digital Materials

Metadata are needed to record the migration history and record contextual information of a digital object (Rechert, Valizada, von Suchodoletz & Latocha, 2012). Accurate and complete metadata is central to access and retrieval of information. In addition, it is important for migration and emulation of digitised resources (Ekoja & Gbaje, 2012). Metadata describe the attributes of the digital object from which the type of system in which it can run can be derived, provide the history and provenance of the digital object, search and retrieval functionality of the digital object in a repository where it is held. Preserving digital objects is difficult if adequate metadata is not present.

Metadata support to the usability of digital materials, it also facilities control in terms of access permissions and how the whole data could be interpreted when accessed (Rosas & Domigues, 2017). Therefore, familiarity with the descriptors is deemed compulsory, according to Lavoie (2014), the OAIS recommended four different types of metadata that could be embedded into the following four categories: (i) description (provided by the user), (ii) technical (extracted by specific tools), (iii) preservation (data from operations carried out during the preservation process), and (iv) structured (defines relationships between files).

Technical Factors Militating the Use of Digital Materials in University Libraries

Technical factors include professional and scientific issues regarding the specificity and characteristics of digital materials. It covers technical-know-how, technologies and environmental conditions as well as factors that endanger digital materials and interfaces with the tasks. Tasks on this level are usually concerned with researching the specificity and structure of paper material and those born digital using various chemical, physical, mechanical methods and procedures. A great challenge of maintaining and sustaining data integrity and authenticity dominates the digital spaces; prominent challenges comprise storage condition, obsolescence of technologies and ease to be damaged when invaded by viruses, hardware and software complaisant.

The speed of change in technological development and without a corresponding funding could make moving with such pace impossible, instead depending on catch up or leap frogging which has dire consequences compared with the traditional print materials. Alegbeleye (2007) identified three changes that may affect the integrity of digital documents which has implication on technical factors militating to use of digital materials to include: accidental change, intentional change that is well meant and intentional change that is not well meant (fraud). Taking this submission according to her, is positive response because it will be unfortunate that while preservation management for traditional media is well developed the same cannot be said of digital media which is now most sort for by students, lecturers and the communities of scholars. Matthews (2009) confirmed this assertion when she acknowledged that preservation management for traditional media is fairly well developed, with management tools and techniques, standards, guidelines and benchmarks to help in the policy development and implementation of preservation programmes. According to her, it is clear that there are quite fundamental differences between the preservation of more traditional types of information carrier and digital materials which requires intermediary technology for access, thereby instituting the need to make deliberate investments on the technical factors.

Inadequate Funding

Financial scourge affects all organizational activities; the use of digital materials is no exception. It enables competent staff to be employed; technology to be procured, buildings to be erected, equipment that supports digital operations to be bought, services to be provided and training and human capital development to be sustained. If an organization lacks adequate finance, or does not use its finance efficiently and effectively, it will fail to meet its objectives (Saka, 2013). Ezeani and Ezema (2009) believed that, for library to discharge its responsibilities satisfactorily, it should be funded adequately. According to Forde (2008) without a visible

budget, digitisation needs have little credence. She maintained that funds should be made available annually rather than as a need arises and to do this may mean producing a three year strategy covering the priorities (as ascertain by benchmarking).

According to Aliyu (2014) despite the National Universities Commission's guidelines on the use of 10% of the recurrent grant of the universities for library, the university management never adheres strictly to it. Discussing the pathetic nature of the situation, Olatokun (2010) affirmed that there is no separate item of library funding in the National Universities Commission warrant sent to universities to intimate them of the grant hence, federal universities libraries are at the mercy of their Vice Chancellors who may distribute the cake as they deem fit. The priority of the administrators of universities was mainly to pay salaries of library staff. In most cases university librarians are at the mercy of the Chief Executive for the release of funds for library projects retarded by virement of library funds to finance non-library projects.

The management of libraries and archives has to some substantial degree with a poor maintenance culture of infrastructural facilities which is a great threat to the preservation of digital materials. Popoola (2003) asserted that the management of libraries and archives has poor maintenance culture of infrastructural facilities such as electricity, buildings and control of other devices such as the computers and other hardware therein. This factor is responsible for easy deterioration of information resources, the systems and the flat form upon which the general operation of the library system is built on. It is upon this that Sunil and Kumar (2009) stated that for any preservation program to succeed in libraries and archives there must be adequate well trained manpower. This is because preservation is a specialized field of knowledge that each and every information professional is required to have that knowledge. Arizona (2010) suggested that such training program should include operating environment control and storage. More so, the skills require for the library staff should include technical proficiency in the areas of encryption, metadata schema coding.

Access and use challenges

The need to provide information content and system is usually a function of professional staff more especially when it comes to digital library services as they are designed for library clientele. As infrastructural services are required by the digital library especially mounting on institutions or at institutional level are needed (Bagudu & Sadiq, 2013, Sekarani, 2006). According to Koehn and Hawandeh (2010), the growing need of users for digital information access have threw challenges to revisit the strategy in managing financial resources and

providing information services to larger communities. In a research conducted by the researcher using telephone interviews which less than 4,000 people drew conclusion that there was an overwhelming preference of internet over the library. Printed documents were more than the electronic subscriptions and acquisition while some libraries require retrospective conversion and digitization of information resources too.

Tzoc and Millard (2011) maintained that the digital technologies help to solve preservation problem of documents in libraries as it enhances access to digitalized documents when compared with electronic networks. In related write-up, Chowdhury (2010) was of the opinion that digital library services are faced with threat of obsolete technology i.e., even the information content of the technology is out-dated. There is expensive conversion of printed text into digital objects as well as division of manpower and resources. Some of the major administrative challenge is in complying with the copyright and intellectual property rights issues.

The library authorities have to discuss seriously with publishers on this aspect in order to involve some mechanism of profit to users, publishers and authors. Users may be charged for each access, downloading from servers, or each kind of digital library collection and this causes the challenge to the user due to cost demands. Security aspects are the most pressing challenge of digital information service. Piracy of database, vital invasion and parallel satellite networking stress are some of the issues academic libraries are confronted as a way of routine. Additionally, there is the challenge caused by lack of expertise, and not too many vendors are available for immediate employment in the country and abroad (Gbaje & Bot, 2009). Overseas vendors charge exorbitantly and are reluctant to import techniques or technology (Liu & Lou, 2011).

In another dimension, Aminu and Shittu (2011, Zaid and Abioye (2009), noted some of the challenges on access and use of digital materials and the effective use of ICT to include:

- Knowledge of ICTs: This was a major problem. ICT application requires a large number of staff participants specially to manage data to really make it available a large users and many users and member of the university community require knowledge of ICT.
- Power outage: for the past few years, the nation has been experiencing power outage. There had been problem with the generation and distribution of power of Nigeria.
- Occasional system failure/poor maintenance of ICT equipment: The system occasionally breaks down and is out of use for few days before the consultants come to rectify the faults. The time lag usually affects the keying in process as data entry has to be stooped.

It would not have been necessary waiting for the consultants if staff had the competence, especially, on the software used. Besides, most of the ICT equipment is poor managed by most institutions if at all they adequately provided. In addition, the cost of maintaining ICT equipment is very high.

- Staff attitude towards ICT utilization/technophobia: Many academics shy away from information and communication technologies for their teaching activities which affect knowledge sharing with their students.
- Inadequate training and technical/skilled manpower: Academics are trained. However, the training is inadequate as academics needs to always acquire more skills especially on the use of latest information and communication technologies. There is a dearth of technical manpower in the area of ICT in Nigeria.

There is also the challenge of trained staff, ICT facilities, and capacity building which are major setback of digital materials use. Without proper training and education, available resources will be under-utilized. They point out that there are many ways that organizations lose knowledge: lay-off and termination, retirement or death, employees walk away, excellent working teams split, databases become infected with virus or whole functions are outsourced etc.

Methodology

Descriptive survey design was used and the population of ICT librarians and lecturers in 22 Federal Universities in Northern States Nigeria was use, in which multi-stage sampling techniques was used to select nine (9) universities, 377 lecturers and 79 ICT librarians. The researcher used copies of questionnaire to collect quantitative data from 321 lecturers and 65 ICT librarians in nine universities in Northern Nigeria. The list of the universities are shown in table 1.

Table 1: Response rate of the administered questionnaires from each university

University	Academic Staff		ICT librarians		Total		
	N / A	N / R	N / A	N / R	N / A	N / R	%
Ahmadu Bello University, Zaria	65	58	16	14	81	72	88.9
Bayaro University, Kano	55	46	10	8	65	54	83.1
University of Jos	40	33	10	6	50	39	78.0
Federal University Technology, Minna.	25	22	12	10	37	32	86.5
University of Maiduguri.	30	27	6	5	36	32	88.9
Abubakar Tafawa University, Bauchi.	25	21	4	4	29	25	86.2
Usman Danfodio University, Sokoto.	60	44	8	7	68	51	75.0
Fed. University of Agriculture, Benue.	27	26	7	6	34	32	94.1
Modibbo Adama University of Technology, Yola	50	44	6	5	56	49	87.5
Total	377	321	79	65	456	386	84.6

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

Findings and Discussion

Table 1: Contribution of access to digital materials and use on research output in the selected Federal University Libraries

Sn	Output facilitated by access to digital materials	SA		A		D		SD		Mean	Std. Dev.
		F.	%	F.	%	F.	%	F.	%		
1	Books	26	40.0	35	53.8	2	3.1	2	3.1	3.3	0.68
2	Chapters in books	19	29.2	31	47.7	4	6.2	11	16.9	2.9	1.02
3	Journal articles	35	53.8	24	36.9	3	4.6	3	4.6	3.4	0.79
4	Conference papers	28	43.1	27	41.5	3	4.6	7	10.8	3.2	0.94
5	Magazine/newspaper articles	16	24.6	23	35.4	9	13.8	17	26.2	2.6	1.13
6	Lecture notes	12	18.5	24	36.9	18	27.7	11	16.9	2.6	0.98
Aggregate mean										3.0	0.66

Key: **SA** = Strongly Agree, **A** = Agree, **D** =Disagree, **SD** = Strongly Disagree, Mean and Std Dev (Decision mean = 2.50)

The impact of access to digital materials and use on research outputs in the universities is most reflected on the number of Journal articles published, Conference papers presented and Books published. In the table 1, the frequency distribution for strongly agree and agree from the perception of ICT librarians is Journal articles, 35 (53.8%) and 24 (36.9%) mean scores of 3.4, for conference papers, 28 (43.1%) and 27 (41.5%) mean scores of 3.2. For books, 26 (40.0%) and 35 (53.8%) mean scores of 3.3, respectively. This results show some levels of variations which may be attributable to the support and encouragement by the respective university managements that staff could publish in numerous media for the dispersion of information, knowledge and innovations. However, the contribution of access to digital materials and use was almost the same on the number of Magazine/Newspaper articles published and Lecture notes in the custody of the library for students use. Mean scores for the two items were approximately the same (2.6 each). With an aggregate mean score of 3.0 for the table, it could be concluded that the use of digital materials in the selected university libraries has major impact on research output of users. The finding here are consistent with Ugwuona and Dike, (2015) who reported that universities are ranked on the basis of their researches/research output and that research helps to

solve professional problems, develop tools and methods for analysis of organizations, services and behaviour whose ultimate benefit lies not only in the generation of new knowledge but in the translation of such knowledge into technologies, interventions and strategies effectively and appropriately delivered to the needy. Overall, the aggregate mean score of 3.0 is higher than the decision rule of 2.5. This implies that access to digital materials and use on research output in the selected Federal University Libraries made remarkable contribution.

Table 3 shows the opinions of the lecturers on the extent of use of the digital materials in the selected university libraries.

Table 3: Opinions of Lecturers on extent of access of digital materials and use for research output in the selected Federal University Libraries

Sn	Extent of access of digital materials and use for research output	SA		A		D		SD		Mean	Std. Dev.
		F.	%	F.	%	F.	%	F.	%		
1	e-thesis/dissertation	99	30.8	155	48.3	53	16.5	14	4.4	3.1	0.80
2	e-journal	138	43.0	139	43.3	38	11.8	6	1.9	3.3	0.74
3	e-books	95	29.6	148	46.1	63	19.6	15	4.7	3.0	0.83
4	e-reference materials	69	21.5	163	50.8	74	23.1	15	4.7	2.9	0.79
5	e-Conference papers	64	19.9	156	48.6	82	25.5	19	5.9	2.8	0.81
6	e-magazines/monographs	40	12.5	103	32.1	143	44.5	35	10.9	2.5	0.85
7	e-Technical reports	34	10.6	117	36.4	113	35.2	57	17.8	2.4	0.90
8	Databases	103	32.1	128	39.9	67	20.9	23	7.2	3.0	0.90
Aggregate mean										2.9	0.59

Key: SA = Strongly Agree, A = Agree, D =Disagree, SD = Strongly Disagree, Mean and Std Dev (Decision mean = 2.50)

The responses of the lecturers on the extent of access of digital materials and use for research output in the selected Federal University Libraries are contained in Table 3. The table confirmed the perceived level of impact of access of digital materials and use on research outputs in the universities studied. In the table, digital materials accesses are arranged in an order of ranks with their respective mean scores. E-journal (3.3), e-thesis/dissertation (3.1), e-books and Databases (3.0 each). Others include, e-reference materials (2.9), e-conference papers (2.8) and e-

magazines/monographs (2.5). However, e-Technical reports were not adequately used as indicated with mean score of 2.4 for it by the lecturers. In response to the use of e-Technical reports, 113(35.2%) and 57(17.8%) of the lecturers disagreed and strongly disagreed with the suggestion that such was being used for research output in the university libraries. Only 34(10.6%) and 117(36.4%) of the lecturers strongly agreed and agreed respectively that e-Technical reports were utilised after gaining access to facilitate research outputs. It suffice to note that the aggregate mean score of 2.9 support the views of the ICT Librarians that use of digital materials facilitates research outputs of the users in the selected Federal Universities.

Extent to which choice of metadata composition promotes usability of digital materials in the Libraries

The choice of metadata composition promotes usability of digital materials in the selected university libraries was assessed from the view point of the ICT librarians on the extent to which the choice of metadata composition promotes usability of digital materials in the selected Federal University Libraries. The objective which examine the extent metadata composition promotes usability of digital materials of Federal University Libraries in Northern Nigeria is aimed at eliciting the opinions of ICT librarians, their response is given in Table 3.

Table 4: Opinions of ICT Librarians on choice of Metadata types for the promotion of access and digital materials use in the selected Federal University Libraries

Sn	Metadata types	SU		U		NU		UD		Mean	Std. Dev.
		F.	%	F.	%	F.	%	F.	%		
1	Administrative	13	20.0	27	41.5	10	15.4	15	23.1	2.6	1.06
2	Descriptive	7	10.8	31	47.7	11	16.9	16	24.6	2.5	0.98
3	Structural	14	21.5	27	41.5	10	15.4	14	21.5	2.6	1.05
4	Technical	11	16.9	30	46.2	15	23.1	9	13.8	2.7	0.92
5	Transformative	12	18.5	32	49.2	13	20.0	8	12.3	2.7	0.91
6	Preservation	22	33.8	32	49.2	6	9.2	5	7.7	3.1	0.86
Aggregate mean										2.7	0.73

Key: **SU** = Strongly Used, **U**= used, **NU**=Not Used, **UD** = Undecided, Mean and Std. Dev (Decision mean = 2.50)

From the opinions of the ICT Librarians expressed, most rated metadata types is those that promote preservation of digital materials (22(33.8%) and 32(49.2%) with mean scores of 3.1). Technical and Transformative, Structural and Administrative promotion also influence choice of metadata types in the libraries as indicated by the mean scores higher than 2.50. However, descriptive promotion purposes for choice metadata type was the least (2.5 mean scores) in the selected university libraries. The percentage distribution shows that 7(10.8%) and 31(47.7%) of the ICT librarians strongly agreed and agreed with the view that Descriptive metadata types was used while 11(16.9%) and 16(24.6%) of the ICT librarians disagreed and strongly disagreed with the view. The aggregate mean scores of 2.7 may suggests that the metadata types used were selected for the promotion of access of digital materials. The finding here agrees with Maravilla (2016) who reported that metadata type that supports preservation is preferred and inevitably supports most managerial and financial modules in addition to enabled for storage and accommodation provisions. Other provision include staffing levels, policies, techniques and methods involved in preserving library and archival materials, and the information contained in them. Hart and de Vries, (2017) argued that accurate and complete metadata is central to both migration and emulation of digital materials therefore necessary to form selection criteria of

metadata type. This is also to accurately render digital objects into emulated environments which could inform the response in the study areas of this study.

Technical factors militating against exploration of digital contents contributions to research output of users of digital material.

Some technical factors assessed here were challenges not solely linked with the operational capabilities of the University libraries alone. Some are part of processes and procedures involved in the Network system information sharing that militate against effective utilization of digital materials. In Table 5, the opinions of the ICT Librarians on the technical factors assessed are shown in relation to the specific objective: “determine the technical factors militating against the exploration of digital contents contributions to research output in Federal University Libraries in Northern Nigeria”.

.Table 5: Technical factors militating against effective utilization of digital materials in the selected Federal University Libraries

Sn	Technical factors militating against the exploration of digital contents by users	SA		A		D		SD		Mean	Std. Dev.
		F.	%	F.	%	F.	%	F.	%		
1	Information availability	27	41.5	22	33.8	12	18.5	4	6.2	3.1	0.92
2	Interactive nature of technology	20	30.8	26	40.0	15	23.1	4	6.2	3.0	0.89
3	Data management	20	30.8	28	43.1	13	20.0	4	6.2	3.0	0.87
4	Portability of digital content	20	30.8	24	36.9	17	26.2	4	6.2	2.9	0.91
5	Device networking	18	27.7	31	47.7	14	21.5	2	3.1	3.0	0.79
6	System connectivity	19	29.2	22	33.8	19	29.2	5	7.7	2.8	0.94
7	Collaboration tools	13	20.0	34	52.3	15	23.1	3	4.6	2.9	0.78

Document transfer protocols	13	20.0	29	44.6	19	29.2	4	6.2	2.8	0.84
Aggregate mean									2.9	0.66

Key: **SA** = Strongly Agree, **A** = Agree, **D** =Disagree, **SD** = Strongly Disagree, Mean and Std. Dev (Decision mean = 2.50)

Availability of required information is foremost but determined by the different technical factors used. This was also rated by the ICT librarians with the resolve to address militating factors for the exploration of digital contents by users. In the table 5, 27(41.5%) and 22(33.8%) with 3.1 mean scores of the Librarians strongly agreed and agreed information availability is key concern for choice of technical factors. Only 12(18.5%) and 4(6.2%) of the Librarians disagreed and strongly disagreed with the opinion shared by others on information availability. Next in the ranking on the effect of technical factors were the Interactive nature of technology, Device networking and data management, respectively. These three factors were rated approximately on the same level with mean scores of 3.0 each. Closely following are Portability of digital content and Collaboration tools rated equally with mean scores of 2.9 each. The next two factors were System connectivity and Document transfer protocols rate by the Librarians at the same level with a mean score of 2.8 each. The overall aggregate mean score for the table is 2.9 and a standard deviation of 0.66 which supported the notion that the listed technical factors are actually militating against effective utilization of digital materials in the selected university libraries.

Conclusion

It was found that digital materials significantly influence research output in federal universities in northern Nigeria. There were some technical factors found to militate against adoption and utilization of the digital information for research output of users were non-availability of required information, interactive nature of technology, device networking and data management among others.

Recommendations

From the study findings, objectives and conclusion, the following recommendations are made:

1. Access and use of digital materials be prioritized to attain effectiveness and efficiency of service delivery on digital platforms supported by the libraries in the zone.
2. Choice of metadata types should be based on possessing modules that support administrative, structural, technical, transformative procedures and preservation.

3. Among challenges identified were inadequate funding, inadequate human and material resources for ICT usage and lack of standard operating preservation procedure. Therefore, it is recommended that there should be library policy on digital preservation and operationalized.

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