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**Institutional Preparedness and Research Data Management Practices: A Study of
Public University Libraries in Akwa Ibom and Cross River States, Nigeria**

Nse Emmanuel Akwang PhD, CLN
University Library, Akwa Ibom State University
P.M.B. 1167, Uyo, Akwa Ibom State, Nigeria
E-mail: nseakwang@aksu.edu.ng

Ekanem B. E. Eyo CLN
University Library, Cross River University of Technology
P.M.B. 1123, Calabar, Cross River State, Nigeria
E-mail: ekanemeyo45@yahoo.com

Mary Bassey PhD, CLN
University Library, University of Uyo
P.M.B. 1017, Uyo, Akwa Ibom State
E-mail: marybassey@uniuyo.edu.ng

Abstract

This study was designed to investigate institutional preparedness and research data management (RDM) practices in public university libraries in Akwa Ibom and Cross River States, Nigeria. Survey research design was employed for the study with a population size of 110 librarians comprising all professional librarians with at least BLIS degree in UNIUYO, AKSU, UNICAL, and CRUTECH libraries. The entire population was used for the study since the number is manageable and accessible. Four research objectives were formulated to guide the study. Questionnaire was used as instrument to elicit data from the respondents. Out of the 110 copies of questionnaire administered, 91 copies were retrieved and found valid for analysis constituting 83% response rate. The responses were analyzed using descriptive statistics in form of frequency count, percentage, mean, and standard deviation. The findings of the study revealed that the public university libraries are not adequately ready for research data management (RDM) practices in relations to staff preparedness. It further showed that the extent of process and technology preparedness vis-à-vis RDM practices is low across the public university libraries. On system preparedness and RDM practices, the finding indicated that the library environment is conducive for collaboration and cooperation among stakeholders with library leadership showing support for RDM practices in the public university libraries. The study, however, concludes that RDM enhances data storage, data sharing and data reuse, with high potential to enhance effective research activities as the core of university institutions. Therefore, based on

the findings, it is recommended that management of public universities should employ adequate library staff with needed competence and skills on research data curation, while staff, including library staff, faculty members and IT staff should be adequately trained through conferences, workshops and other in-house fora on RDM practices, among other measures.

Keywords: Institutional preparedness, research, RDM, Data lifecycle, public university libraries

Introduction

It is universally recognized that research is one of the traditional functions of higher institutions. This is basically made possible through the establishment and development of academic libraries. The extent to which the function can be achieved depends on the institutions' preparedness in supporting the libraries towards the management of research data. Research data, as defined by Nhakura & Muvunzwi (2019) are the original information sources or materials that are collected, observed, generated or created, for purposes of analysis and validation of original research results. Research data comes in many different formats categorized under digital and non-digital and could be gathered using a wide variety of methods which include published literature sources, surveys, interviews, observations, experimentation, models, etc.

Research data are gathered and used across various academic programmes offered in higher institutions. The importance of research data, especially in

academic environment cannot be overemphasized. They are used to prove or disprove a theory, bolster claims made in research, or to further the knowledge around a specific topic or problem. Research data remain the primary building block of all information which should be managed to ensure that they are discoverable and accessible over a long time. Properly managed and shared research data have the potential to yield multiple benefits throughout and beyond the life of a research project when reused in primary research, follow-up, and synthesis studies as well as in interdisciplinary and data-intensive research (Jones, Pryor, & White (2013) cited by Kwangwa & Kusekwa, 2019).

The management of research data is increasingly recognized as one major practice in universities that must not be taken for granted. There is need to reduce the risk of data loss, improve research activity, ensure continuity of research, and facilitate sharing and re-use of research data for further researches. Again, given

the changing research landscape brought by technological advances, exponential growth of research data generated by academics, research funding requirement by local and foreign funding agencies, and promotion conditions for academic staff, all academic institutions must embrace RDM with all amount of seriousness. University libraries as major stakeholders in RDM are expected to be more prevalent in incorporating into their offerings the services that promote RDM. The perceived need to stay relevant in a changing digital research world, and a thoughtful assessment of the needs of researchers could be other considering factors for provision of RDM services in university libraries. But this may not be visible without institutional preparedness. Against this background, the empirical study of institutional preparedness and RDM practices in university libraries becomes imperative. The paper presents a brief overview of the research content, discussing in particular the concept of RDM, empirical evidences, and underlying frameworks to further explain the concepts of the study. The paper presents the research methodology used and the results to provide perspectives on the relationship between institutional preparedness and RDM practices in public university libraries in Akwa Ibom and Cross River States, Nigeria. The constructs of institutional preparedness

considered in the study are staff preparedness, process preparedness, technology preparedness, and system preparedness.

Objectives of the Study

The purpose of this study is to survey institutional preparedness and RDM practices in public university libraries in Akwa Ibom and Cross River States. Specifically, this study seeks to achieve the following objectives:

1. To examine the staff preparedness for RDM practices in the public university libraries studied.
2. To determine the process preparedness for RDM practices in the public university libraries studied.
3. To assess the technology preparedness for RDM practices in the public university libraries studied.
4. To examine the system preparedness for RDM practices in the public university libraries studied.

Statement of the Problem and its Significance

The importance of RDM lies on the fact that knowledge in whichever field grows and moves toward more collaborative and data-intensive research in which the results need to be collated, stored, preserved, and shared for future researches among different communities

of practice. The RDM process involves a number of stakeholders, both within and outside the academic environment including libraries, government agencies, funders, IT services providers, management team, faculty members, etc. Be that as it may, academic libraries occupy the unique position in the entire RDM effort as they provide broad-based information services to all other stakeholders. The librarians' extensive experience and familiarity with data organization, from its entry to the research cycle to the dissemination and archiving of valuable research results place libraries at the vortex of RDM in academic institutions. The importance of RDM and the overwhelming role of libraries have been discussed extensively in many fora globally either remotely or physically. It is widely proclaimed that RDM enhances the visibility of research data, facilitates sharing and re-use of research data, provides opportunities for collaboration and partnership among researchers, etc. But, unfortunately the management of research data in most academic libraries in Nigerian states seems not to be given required attention. This is evidenced in the non-provision of research data services such as curation services and other activities capable of raising awareness of the nitty-gritty of research data and its management. Based on the situation, the researchers survey the institutional

preparedness and RDM practices in public university libraries in Akwa Ibom and Cross River States, Nigeria.

Review of Related Literature

The literature reviewed in this study covered conceptual considerations on RDM, underlying frameworks on institutional preparedness and RDM, and empirical evidences that relate with RDM in libraries.

Conceptual Considerations on Research Data Management (RDM)

RDM is a field of scientific inquiry within the emerging research paradigm of e-Science or e-Research which is increasing attracting more attention from government, funding bodies, academic and research institutions, and researchers for its value and prospects for advancing knowledge (Frederick & Run, 2019). RDM is concerned with the collection and organization of data generated in the process of conducting investigations or research reports from its entry to the research cycle through to the dissemination and archiving of valuable results (Chiwere & Mathe, 2015). Going by the above narration, it could be rightly considered that RDM is not entirely new to university libraries because they have been providing series of services that involve the collection, organization, and dissemination of data for research purposes. However, the recent integration

of the term RDM into library practice has altered or expanded the entire process of managing research data.

Today, RDM takes into account various processes and activities involving the design and creation of data, storage, preservation, retrieval, sharing, and reuse bearing in mind technical capabilities, ethical considerations, legal issues, and governance frameworks (Kwangwa & Kusekwa, 2019). The changing nature of research landscape has resulted in vast quantity of digital research data in a variety of formats at a rapid rate in universities. This leads to proliferation of information or data in terms of volumes, varieties, and velocity. Many researchers find it difficult to conduct researches due to their inability to access relevant research data even with the multiple “volumes” of research data. As a response to salvage the situation, university libraries in collaboration with other stakeholders within and outside their host institutions should offer RDM services to assist researchers in meeting their research needs. The various stakeholders in RDM practices include government, university management team, research funders/donors, IT services providers, faculty members, among others.

The importance of RDM in universities cannot be overemphasized. It lies primarily on the fact that knowledge in all

academic fields grows and moves toward more collaborative and data-intensive research of which the results need to be collated, stored, preserved, and shared for future researches (Yoon & Schultz, 2017).

The importance of effective management of research data by academic libraries, as noted by Akwang & Chima (2021), could be subsumed under the following reasons:

- Facilitates scholarly communications among research communities in terms of visibility of research data and citations as well as sharing and use of research data, etc.

- Enables compliance with the policy of local and foreign funding agencies which requires the development of a formal data management plan as condition for research funding.

- Strengthens the codes of academic practices in terms of research integrity, validation of research findings, and reproducibility of results, among others.

- Enables conformity with publishers' policy which demands, among others that researchers should provide information on how to handle project data, how to collect the data, and in what form the research results should be made accessible for future research.

- Provides opportunities for collaboration and partnership among researchers and communities of practice, among others.

It could be rightly considered that RDM is assuming an increasingly prominent place

in academic institutions especially with the promotion requirement for faculty members being tied to the number of research papers published within their promotion year. This function demands that university libraries provide environment conducive for seamless access to research data in respective academic disciplines. University libraries as information hubs need to re-define their role in recognition of their lead position in the RDM effort in order to meet the expectations of faculty members, students, and other members of academic communities. In other words, they should

be properly guided on how to source for information, how to conduct data analysis, and how to communicate research data.

Underlying Frameworks on Institutional Preparedness and RDM

This study adopts Framework for Assessing Institutional Readiness (FAIR) developed by Agbabiaka & Ojo (2014) to explicate the institutional preparedness towards RDM practices in libraries and Modified UK Data Archive Research Data Lifecycle model by Nhendodzashe & Pasipamire (2017) to explain the core activities of RDM.

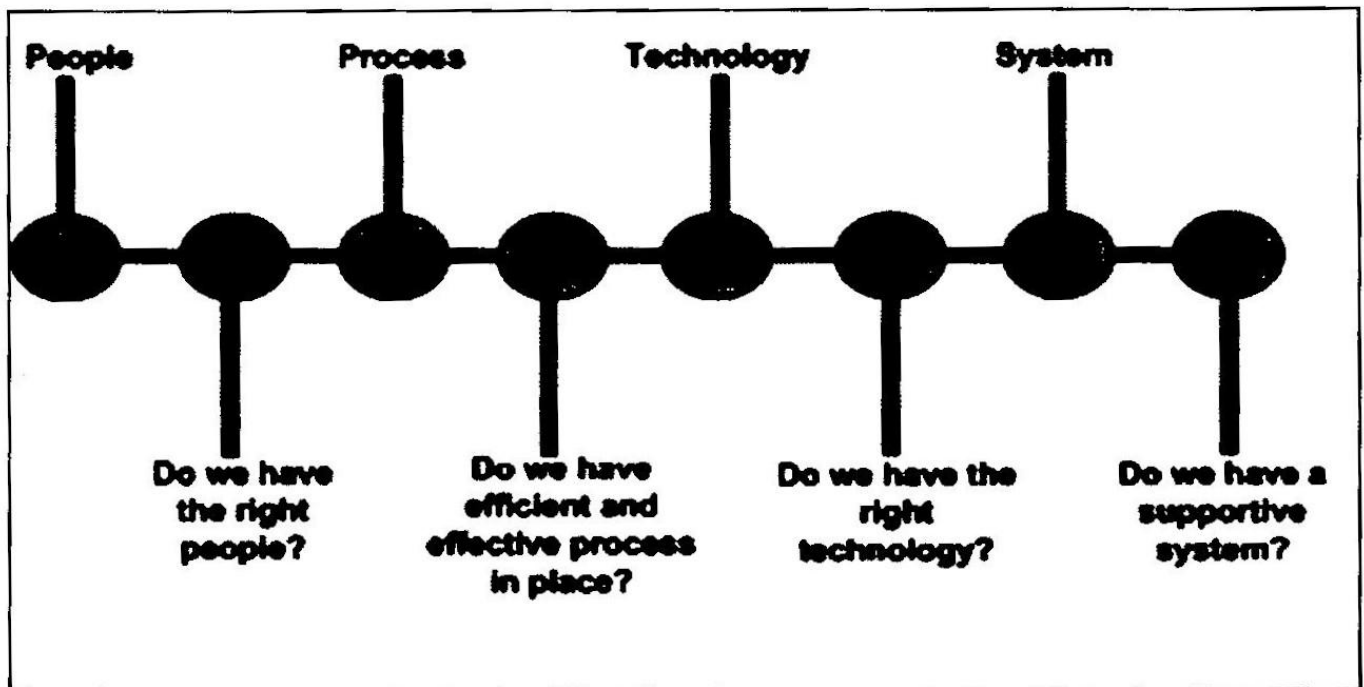


Figure 1: Framework for Assessing Institutional Readiness (FAIR) by Agbabiaka & Ojo (2014).

Institutional preparedness simply means the institutions readiness to engage in a project. It involves having the right conditions and resources in place, having a clear vision and objectives, the right motivation system as well as the right attitude to make the project succeed. The FAIR model is used in this study to assess the level of institutional preparedness using specific dimensions – people, process, technology, and system.

People Preparedness: The most important factor to determine the preparedness of any institution including universities is people or staff. This critical element covers the quality and competence of staff who are directly involved in the RDM practice which includes librarians, faculty members, and IT staff. This is in line with Henderson & Knott (2014) observation that the introduction and success of RDM in academic libraries calls for the need to hire new staff or re-skill librarians and other stakeholders to take up new roles and responsibilities. People preparedness enables universities to ensure that the right people with the right competence are employed, trained, re-trained, and used in the RDM practice.

Process Preparedness: Another important element in institutional preparedness is the process which facilitates the assessment of the maturity and capability of any institution to take up RDM. This focuses on plan, activities, services, strategies, etc., needed for effective RDM practices. Erway (2013) notes that process development should be seen as a cross-institutional responsibility whereby the major stakeholders - university management, librarians, faculty members (researchers), IT specialists, etc., are involved in deciding the plan, services, and strategies put in place to ensure good data stewardship.

Technology Preparedness: Technology responds to a number of drivers including data collection, storage and preservation, access, and sharing which are the activities of RDM. With the impacts created by information technologies, it is compelling on institutions to put in place the right technologies to ease the tasks involved at every level of RDM. In choosing the right software, hardware, and connectivity, it is necessary to consider the efficiency, economy value, ease of use, and availability of the technologies.

System Preparedness: System as used in this model means the operating and enabling conditions within the library. It is

concerned with the evaluation of issues that could exert positive or negative effects on the library. Such includes library leadership, legal powers, institutional concern, policies, and current

practices that could guarantee the conduciveness of the library for collaboration and cooperation among stakeholders.

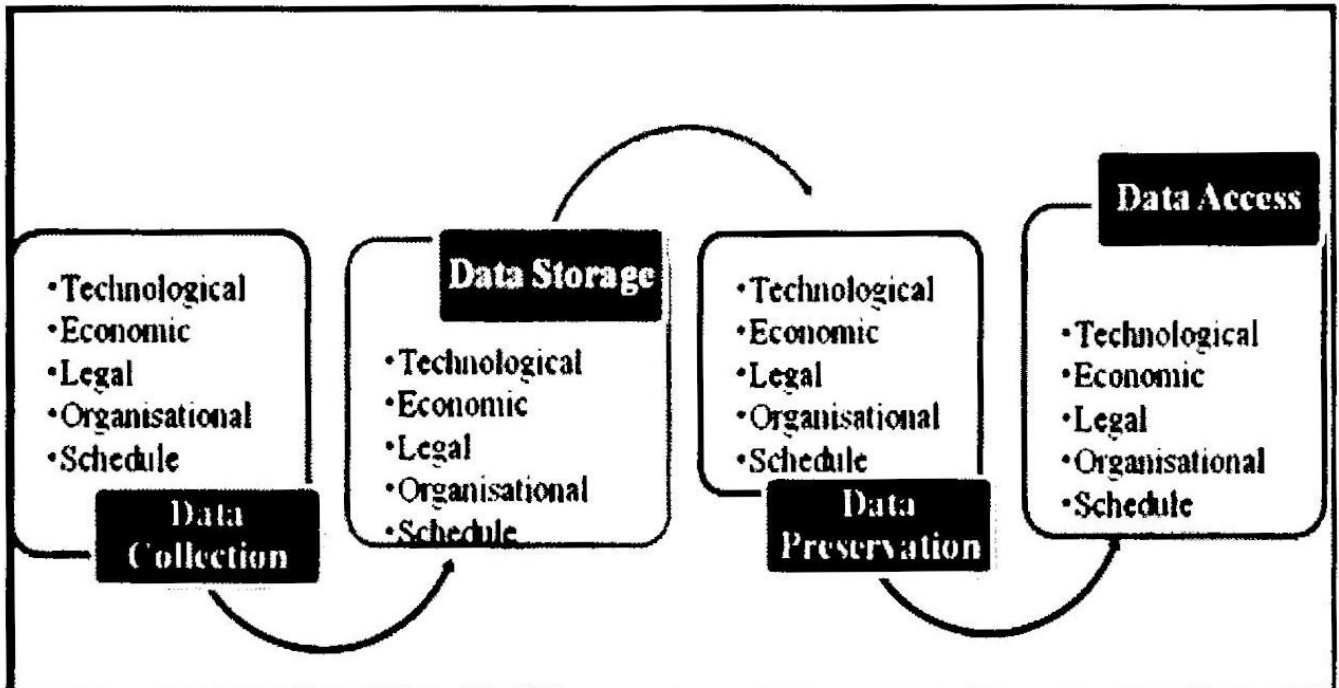


Figure 2: Modified Research Data Lifecycle Model by Nhendodzashe & Pasipamire (2017).

Nhendodzashe & Pasipamire (2017) arrived at this model by modifying the Technological, Economic, Legal, Organizational and Schedule (TELOS) feasibility framework and the UK Data Archive Research Data Lifecycle model (UK Data Archive, 2015). The modified model is adopted in this present study to assess the enabling factors for setting up RDM services in university libraries. The modified model establishes four stages of data lifecycle through which institutional preparedness should be evaluated.

Institutions and other stakeholders are expected to take into account the technological, legal, economic, organizational, and schedule obligations as research data is collected, recorded, processed and published to the researchers, colleagues, research funders, and institutions.

Data Collection: This first stage of data cycle is a systematic process of gathering research data from a variety of sources. The research data could be primary data like laboratory experiments and field

study or secondary data like information from existing data – books, journals, etc. At this stage, libraries develop a data-collection plan which clearly spells out the type of data to collect; the appropriate data sources and ways to actually collect the data. However, libraries create a unit where researchers can visit to hand over a photocopy of their research work in print or saved in any storage device like flash drive, CDs, etc., and research work can also be collected or sent via e-mail, WhatsApp, or any other online tool. This stage demands that libraries also provide data reference, help researchers to collect, purchase and/or license third party data sets that may be necessary to their research, and advice researchers on the appropriate ways of documenting the collection process.

Data Storage: This is the next stage, where data and metadata collected from whatever source and in whatever format are held for future use. The libraries must ensure that all research data is stored appropriately and securely on storage devices and backed up or copied regularly into external storage system to avoid data loss and so that it can be located when needed. Apart from the traditional method of storing print research data on shelves, cabinets, etc., libraries store research data electronically in USBs, flash drives, external drives, and cloud storage platforms, among others.

Data Preservation: This stage involves migrating data to suitable formats and media for the purpose of preservation. Institutions must ensure that there are laid down procedures and facilities that will enable the libraries to keep research data files for an extended period of time by choosing durable formats, archiving files locally, and/or submitting research data files to a data repository. Strasser (2014) stresses that creating backups and any additional metadata become necessary for preservation of research data.

Data Access: This is the stage whereby institutions make certain efforts to distribute research data, share data, control access, establish copyright and promote data (UK Research Data Archive, 2015). It is pertinent to note that data access does not only require that the data is made available in libraries, but also that it can be found and appropriate rights provided for its reuse among researchers.

Empirical Evidences on RDM and Libraries

A cursory review of literature proves that many studies conducted to assess the feasibility of offering RDM were done mostly in developed countries and few evidences in developing countries.

Fearon et al (2013) conducted a survey among ARL member institutions to examine current RDM activities in ARL libraries. The results showed that RDM services and support for data archiving

were the emerging services offered by the libraries. It also revealed that 54 out of 125 ARL libraries already provided RDM services with varying capacities, and 17 libraries reported planning for RDM service provision in the near future. Another important finding from the survey was the need for collaborations between libraries and other units within the institution. Der (2015) explored the academic libraries' readiness for research data management from Hungary and Estonia. The study revealed that academic libraries were indeed at the beginning of addressing the issue. As at the time of investigation, only a few institutions' libraries offer services in support of RDM. Chiware & Mathe (2015) conducted a study to establish the requirements for setting RDM services at Cape Peninsula University of Technology (CPUT) library in South Africa. It was revealed that there was a great need for structured RDM services and tools for setting up RDM platforms that include technology, staff, and policies within the institution. Ndhlova (2016) examined the preparedness for digital curation and presentation at the National University of Sciences and Technology in Zimbabwe. The findings showed that there were inconsistencies in digital curation and low ICT competences among library staff. Tenopir et al (2017) surveyed the prevalence of research data services

among members of the Association of European Research Libraries (LIBER). The findings revealed that 45% of libraries surveyed provided services in form of consultations with researchers and students regarding DMP, 44% provided consultations on metadata standards for RDM, and 37% provided reference support. Faniel & Connaway (2018) reported in a survey involving 36 library professionals that there were five factors contributing to librarians' RDM support which are human resources, communication, coordination, collaboration, technical resources, leadership support, and researchers' perceptions of the library. Tang & Hu (2019) conducted a survey on RDM services in libraries using 240 practicing librarians. The findings of the study revealed the impact of the level of preparedness and degree of development in RDM roles on the types of RDM services provided by the librarians. Chiparausha & Chigwada (2019) conducted a survey to ascertain Zimbabwean librarians' awareness and preparedness to offer RDM services. The findings revealed among others that majority of the respondents were of the opinion that institutional preparedness were noted in providing skilled personnel, Internet connection, and services. The results also indicated low preparedness in the areas of ROAR membership.

partnership research data alliance, and partnership with data cite.

Odigwe, Basse, & Owan (2020) examined how the management of data in higher institutions affects the quality of academic research conducted by university lecturers in South-South of Nigeria using 602 lecturers. The findings revealed that data storage, data security, data retrieval, data sharing, and data reuse jointly contribute to the total variance in research effectiveness of university lecturers in terms of proper citations, problem solving, knowledge creation, and generation of testable data.

Chigwada (2022) conducted a study on management and maintenance of research data using 100 researchers in thirty research institutions in Zimbabwe. The study, which collected data using online questionnaire found out that researchers are aware of current trends in research data management issues and are managing their data using machines and external hard drives. The study also revealed that research data management practices become a requirement for accessing research grants. It showed that librarians have a bigger role to play in creating awareness on RDM among researchers and hosting data repositories for archiving research data.

Despite the vast number of studies

conducted on RDM in libraries, there have been limited studies investigating into institutional preparedness and RDM in libraries even at the global scene. This study is therefore conducted to fill the research gap.

Methodology

This study adopted survey research design to investigate the institutional preparedness and RDM practices in public university libraries in Akwa Ibom and Cross River States, Nigeria. The design was considered appropriate since the research deals with homogeneous subjects and the information required is discrete. All the public university libraries in the two states were studied. These are: University of Uyo (UNIUYO) library, Akwa Ibom State University (AKSU) library, University of Calabar (UNICAL) library, and Cross River University of Technology (CRUTECH) library. The population of this study comprises all professional librarians with at least a Bachelor Degree in Library and Information Science as recognized by the employer. The population is 110 librarians (see Table 1 for the breakdown) from the four institutions. They were considered for this study because they are professionals and are in the position to understand and give appropriate answers to questions regarding the variables studied. The population size was

manageable and was used as sample. Hence, this study adopted purposive sampling technique. A researcher-developed questionnaire with twenty-seven (27) items grouped under Sections A and B was used as instrument for data collection. The instrument was face and content validated by three experts – two from Library and Information Science and one from Science Education, Faculty of Education, University of Uyo. The reliability of the instrument was determined using Cronbach Alpha test and the coefficient of 0.78 was established. Copies of the questionnaire were distributed to all the 110 respondents personally by the researchers. Out of the

number, 91 copies were completed and returned for analysis (see Table 2 for the breakdown), making it 83% rate of returns. The responses from the questionnaire were analyzed using simple percentage, mean scores and standard deviations in Tables

Results and Interpretations

Data generated for the study were presented in Tables using simple percentage, mean scores and standard deviations. The presentation focuses on the population of the study across the university libraries studied, questionnaire distributed and retrieved as well as information pertaining to the research subject as provided by the respondents.

Table 1: Population Distribution of Librarians according to University Libraries

University Libraries	Location	Population of Professional Librarians	Sample of Professional Librarians	Percentage (%)
UniUyo Library	Akwalbom State	35	35	100
AKSU Library	Akwalbom State	20	20	100
UniCal Library	Cross River State	41	41	100
CRUTECH Library	Cross River State	14	14	100
Total	-	110	110	100

Source: Administrative Records (2021)
Table 1 shows the result of population distribution of librarians across the university libraries studied. It revealed that University of Uyo (UNIUYO) Library, AkwaIbom State has 35 librarians, AkwaIbom State University

(AKSU) Library has 20 librarians, University of Calabar (UNICAL) Library has 41 and Cross Rivers State University of Technology (CRUTECH) Library has 14 librarians. All the librarians were used for the study.

Table 2: Distribution of Questionnaire and Rate of Returns according to University Libraries

University Libraries	No of Questionnaire Distributed	No of Questionnaire Returned	Percentage of Returns (%)
UniUyo Library	35	31	89
AKSU Library	20	20	100
UniCal Library	41	26	63
CRUTECH Library	14	14	100
Total	110	91	83

Table 2 reveals that out of one hundred and ten (110) copies of questionnaire distributed to the respondents in the university libraries studied, ninety-one (91) copies of the questionnaire were returned indicating a total of 83 percent of returns. This study therefore is based on the 91 copies of the questionnaire.

Table 3: Distribution of Respondents by Qualification and Present Rank according to Institutions

Items	UniUyo	AKSU	UniCal	CRUTECH	Total	%
Qualification	-	-	-	-	-	-
BLS/BLIS	11	13	9	2	35	38
MLS/MLIS	12	4	13	9	38	42
PhD	8	3	4	3	18	20
Total	31	20	26	14	91	100
Present Rank	-	-	-	-	-	-
University Librarian	-	1	-	1	2	2.19
Deputy University Librarian	-	-	-	-	-	-
Senior Librarian	4	2	2	1	9	9.89
Librarian I	5	2	3	1	11	12.08
Librarian II	5	-	4	4	13	14.28
Assistant Librarian	3	2	2	3	10	10.98
Graduate Library Assistant	1	2	1	1	5	5.49
Chief Library Officer	2	-	-	-	2	2.19
Assistant Chief Library Officer	1	-	1	-	2	2.19
Principal Library Officer I	2	1	2	1	6	6.59
Principal Library Officer II	1	1	2	1	5	5.49
Senior Library Officer	3	3	2	1	9	9.89
Higher Library Officer	3	3	4	-	10	10.98
Library Officer	1	3	3	-	7	7.69
Others	-	-	-	-	-	-
Total	31	20	26	14	91	100

Table 3 reveals that 35 (38%) librarians have BLS/BLIS, 38 (42%) librarians have MLS/MLIS and 18 (20%) have PhD in LIS. This result indicates that majority of librarians in the libraries studied have MLS/MLIS as qualification. For the present rank of the respondents, the findings reveal that majority of the respondents 13 (14.28%) were Librarian II, followed by 11 (12.08%) Librarian I, 10 (10.98%) Assistant Librarian and 10

(10.98%) Senior Library Officer. Only 2 (2.19%) University Librarians, 2 (2.19%) Chief Library Officers, 2 (2.19%) Assistant Library Officers were part of the study. (AKSU) Library has 20 librarians, University of Calabar (UNICAL) Library has 41 and Cross Rivers State University of Technology (CRUTECH) Library has 14 librarians. All the librarians were used for the study.

Table 4: Staff Preparedness and RDM Practices in the Public University Libraries (n = 91)

S/N	Item Statements	SA	A	D	SD	Mean	Std. Dev.	Decision
1	The library has adequate staff with needed competency on research data curation	2	13	58	18	1.99	0.658	Disagreed
2	The university sponsor library staff to conferences and workshops on RDM	0	13	55	23	1.89	0.623	Disagreed
3	In-house training on RDM is organized for library staff	1	10	55	25	1.86	0.642	Disagreed
4	Faculty members and IT staff share relevant knowledge on data management practices	0	16	54	21	1.95	0.639	Disagreed
5	Library staff and faculty members share relevant knowledge on data management practices	2	20	47	22	2.02	0.745	Disagreed
6	IT staff are skilled to provide technical services in support of RDM practices in the library	41	32	15	3	3.22	0.811	Agreed
Grand Mean						2.16		
Criterion Mean						2.50		Disagreed

Source: Researchers' Field Survey, 2022

Table 4 reveals that the respondents disagree to the statement that staff preparedness relates with RDM practices in public university libraries studied. This is determined by the result of the analysis which shows a low grand mean of 2.16 against the criterion mean of 2.50. It indicates that out of the 6 items measuring the staff preparedness vis-à-vis RDM practices in the public university libraries studied, only 1 item was agreed upon by the respondents, which shows that IT staff are skilled to provide technical services on RDM practices in the libraries (3.22). On the other hand, the finding reveals that the public university libraries investigated do not have adequate library staff with needed competence on research data curation (1.99); the library staff are not sponsored to

conferences and workshops on RDM (1.89); library staff do not have access to in-house training on RDM (1.86); faculty members and IT staff do not share knowledge on data management practices (1.95); and library staff and faculty members do not share knowledge on data management practices (2.02). This is an indication that the universities studied do not employ, train, and re-train enough staff to acquire the right competence for RDM practices, thus there is low preparedness in terms of staffing.

Research Question 2: To What Extent Does Process Preparedness Relates with RDM Practices in the Public University Libraries?

S/N	Item Statements	SA	A	D	SD	Mean	Std. Dev.	Decision
Table 5: Process Preparedness and RDM Practices (n = 91)								
1	The university has developed plan for RDM	12	48	21	10	2.68	0.842	Agreed
2	The university has setup a committee to oversee the activities of RDM	2	21	38	30	1.95	0.808	Disagreed
3	There are strategies put in place by my institution to guarantee good RDM	5	19	40	27	2.02	0.856	Disagreed
4	The library has a division/unit set aside for RDM practices	10	20	32	29	2.12	0.987	Disagreed
5	The library has a functional Institutional Repository (IR) where research data is managed	14	19	31	27	2.22	1.041	Disagreed
6	The library offers services associated with research data lifecycle (collection, storage, preservation, and sharing of research data)	17	41	15	18	2.63	1.007	Agreed
Grand Mean						2.27		Disagreed
Criterion Mean						2.50		

Source: Researchers' Field Survey, 2022

conferences and workshops on RDM (1.89); library staff do not have access to in-house training on RDM (1.86); faculty members and IT staff do not share knowledge on data management practices (1.95); and library staff and faculty members do not share knowledge on data management practices (2.02). This is an indication that the universities studied do not employ, train, and re-train enough staff to acquire the right competence for RDM practices, thus there is low preparedness in terms of staffing.

Research Question 2: To What Extent Does Process Preparedness Relates with RDM Practices in the Public University Libraries? Table 4 reveals that the respondents disagree to the statement that staff preparedness relates with RDM practices in public university libraries studied. This is determined by the result of the analysis which shows a low grand mean of 2.16 against the criterion mean of 2.50. It indicates that out of the 6 items measuring the staff preparedness vis-à-vis RDM practices in the public university libraries studied, only 1 item was agreed upon by the respondents, which shows that IT staff are skilled to provide technical services on RDM practices in the libraries (3.22). On the other hand, the finding reveals that the public university libraries investigated do not have adequate library staff with needed

competence on research data curation (1.99); the library staff are not sponsored to conferences and workshops on RDM (1.89); library staff do not have access to in-house training on RDM (1.86); faculty members and IT staff do not share knowledge on data management practices (1.95); and library staff and faculty members do not share knowledge on data management practices (2.02). This is an indication that the universities studied do not employ, train, and re-train enough staff to acquire the right competence for RDM practices, thus there is low preparedness in terms of staffing.

Table 6: Technology Preparedness and RDM Practices (n = 91)

S/N	Item Statements	SA	A	D	SD	Mean	Std. Dev.	Decision
1	The library has functional computer systems for effective RDM practices	23	42	19	7	2.89	0.875	Agreed
2	There is constant network connectivity in the library for good RDM practices	12	20	39	20	2.26	0.953	Disagreed
3	The library has relevant software in support of RDM practices	11	19	41	20	2.23	0.932	Disagreed
4	The library ensures prompt maintenance of the technological facilities in the library	3	16	43	29	1.92	0.792	Disagreed
5	Defective parts are replaced on time	4	20	40	27	2.01	0.837	Disagreed
6	The library has dependable alternative electrical power supply in case of power outage	18	45	18	10	2.78	0.892	Agreed
Grand Mean						2.35		Disagreed
Criterion Mean						2.50		

Table 6 reveals a low extent of relationship between technology preparedness and RDM practices in the public university libraries studied. The results specifically show that out of the 6 items of investigation, 2 items including provision of adequate functional computer systems for effective RDM practices (2.89); and supply of dependable alternative electrical power in case of power outage (2.78) were agreed by the respondents. On the contrary, 4 items, which include: constant network connectivity in the library for good RDM practices (2.26); relevant software in support of RDM practices (2.23); prompt maintenance of technological facilities in the libraries (1.92); and replacement of

defective parts on time (2.01) were disaffirmed by the respondents. Thus, revealing the low extent of the relationship between technology preparedness and RDM practices in the public university libraries with a low grand mean of 2.35 as against the 2.50 criterion mean. The inference drawn here is that the universities studied are not adequately prepared as regards the provision of technological facilities for RDM practices.

Table 7: System Preparedness and RDM Practices (n = 91)

S/N	Item Statements	SA	A	D	SD	Mean	Std. Dev.	Decision
1	The university management has shown interest in RDM practices	10	53	20	8	2.71	0.779	Agreed
2	The library has legal power to undertake data curation practices	5	38	39	9	2.43	0.747	Disagreed
3	The university has developed policies to guide the RDM practices	8	21	41	21	2.18	0.889	Disagreed
4	The library leadership supports RDM practices	14	54	17	6	2.84	0.764	Agreed
5	The current library practices support RDM practices	6	29	42	14	2.30	0.810	Disagreed
6	The library environment is conducive for collaboration and cooperation among other stakeholders in the RDM practices	31	43	15	2	3.13	0.763	Agreed
Grand Mean						2.60		Agreed
Criterion Mean						2.50		

Source: Researchers' Field Survey, 2022

The analysis on Table 7 shows the relationship between system preparedness and RDM practices in public university libraries in Akwa Ibom and Cross Rivers States, Nigeria. The finding reveals a positive relationship between the variables with a grand mean of 2.60 against the criterion mean of 2.50. It specifically indicates that out of the 6 items of investigation, 3 items, which are: library environment is conducive for collaboration and cooperation among other stakeholders in the RDM practices (3.13); library leadership supports RDM practices (2.84); and university management has shown interest in RDM practices (2.71) were agreed upon by the respondents. On the other hand, the data

analysis reveals that the respondents disaffirmed 3 items of the investigation, which are: library has legal power to undertake data curation practices (2.43); university has developed policies to guide the RDM practices (2.18); and current library practices support RDM practices (2.30). This is an indication that the universities studied have positive interest, good library leadership, and conducive library environment in support of RDM practices, thus they are prepared to a fair extent for the RDM practices.

Discussion of Results

The study empirically examined institutional preparedness and RDM practices in public university libraries in

Akwa Ibom and Cross River States, Nigeria. It investigated the institutions' extent of staff preparedness, process preparedness, technology preparedness and system preparedness in relations to RDM practices.

On how staff preparedness relates with RDM practices in the public university libraries studied, the result revealed that the relationship between staff preparedness and RDM practices in the public university libraries is poor. This is reflected in the negative outcome of the grand mean of 2.16 against the criterion mean of 2.50. This shows that staff of the universities under investigation do not have adequate competence for effective RDM practices. The finding agrees with the study conducted by Fearon et al (2013), which showed insignificant activities among ARL member institutions in relation to current RDM activities in ARL libraries. It also agrees with the study conducted by Chiparausha & Chigwada (2019), which indicated low staff preparedness in ROAR membership, partnership research data alliance, and partnership with data cite.

On the extent of process preparedness and RDM practices in the public university libraries studied, the result indicated a low extent of process preparedness across the university libraries with 2.27 grand mean

against 2.50 criterion mean. The results showed that the university libraries actually have plans for RDM but the plans are not effectively implemented. It also showed the libraries offer services associated with research data lifecycle such as collection, storage, preservation, and sharing of research data. However, the findings revealed that the university libraries studied do not have committee to oversee the activities of RDM, have no strategies in place to guarantee good RDM, create no division/unit for RDM practices, and have no functional Institutional Repository (IR) to manage research data. The finding validates the studies conducted by Der (2015); Fearon et al (2013), which revealed that academic libraries are practically at the beginning phase of addressing research data management (RDM) issues, with only a few libraries offering services in support of research data management.

Pertaining to the extent of relationship between technology preparedness and RDM practices in the public university libraries, the results showed that the extent of relationship between technology preparedness and RDM practices is low with grand mean of 2.35 against the criterion mean of 2.50. The result revealed that though the university libraries investigated have functional computer systems and dependable alternative

electrical power supply to augment power outages for effective RDM practices, they lack constant network connectivity for good RDM practices, lack relevant software to support RDM practices, lack of prompt maintenance of technological facilities in the libraries, and do not replace defective parts of technologies on time. The finding, however, agrees with the study conducted by Tenopir et al. (2015); Ndhloya (2016), which revealed that there are some inconsistencies in digital and technology related issues among academic libraries to carry out RDM practices.

The results of the finding showed that there is a positive relationship between system preparedness and RDM practices in public university libraries in Akwa Ibom and Cross River States, Nigeria with 2.60 grand mean against 2.50 criterion mean. It revealed that the library environment is conducive for collaboration and cooperation among other stakeholders in the RDM practices, library leadership supports RDM practices, and that the university management has shown interest in RDM practices. However, there are still gaps to be closed in the areas of library legal power to undertake data curation practices, the universities to develop policies to guide the RDM practices while ensuring that the current library practices

provide support to RDM practices. This finding however, agrees with the position of Faniel & Connaway (2018), which pointed out communication, coordination, collaboration, technical resources, and leadership support as factors that enhance RDM practices in academic libraries.

Research and Practical Implications of the Findings

Research Data Management (RDM) facilitates data storage, data security, data retrieval, data sharing, and data reuse, which are essential in contributing to research effectiveness in the universities by enhancing proper citations, problem solving, knowledge creation, and generation of testable data. However, in this study, it has been observed that in all the university libraries investigated, the factors that support RDM practices such as: staff preparedness, process preparedness, technology preparedness, and system preparedness fall short of expectation. This implies that achieving effective research data management practices by libraries in public universities is seriously challenged. It also means that quality research activities by lecturers and other researchers become almost impossible. This could also mean that lecturers and other researchers go on their own to conduct researches without adequate necessary institutional research

support system. The findings of this study also provide information for future research references thereby taking care of the hitherto local knowledge gap in research data management.

Conclusion and Recommendations

It is ascertained that quality research is a product of effective RDM practices. In this wise, it is concluded that RDM be given necessary attention by all stakeholders such as university management team, university libraries, government agencies, providers of funds, IT services providers, faculty members, etc. This requires re-strategizing and improvement of efforts and interests in RDM objectives by providing effective staff training and re-training, technological facilities, and system support, which are currently compromised in the public university libraries under investigation.

Based on the findings of the study, the following recommendations are necessary:

- i. Management of public universities should employ adequate library staff with competence and skills on research data curation.
- ii. Management of public universities should adequately train their staff, including library staff, faculty members and IT staff through conferences, workshops and other in-house fora on RDM practices.
- iii. Staff of public universities including library staff, faculty members and IT staff should willingly share knowledge to equip themselves with RDM practices.
- iv. Management of public universities should provide inadequate functional computer systems to enhance effective RDM practices.
- v. Information technology (IT) services providers should provide constant network connectivity in order to facilitate good research data management practices.
- vi. Management of public university libraries should ensure prompt maintenance of technological facilities in the libraries so as to support RDM practices.
- vii. Management of public universities should collaborate with other stakeholders, including library staff, IT services providers, faculty members, etc., to develop plans, strategies and policies as well as set up divisions/units in order to encourage research data management activities.
- viii. Public university libraries should set up and promote functional Institutional Repository (IR) in order to manage research data activities.

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