

**RESEARCH DATA MANAGEMENT SERVICES IN NIGERIAN ENERGY
RESEARCH INSTITUTES: A STUDY OF AWARENESS, POLICY, PRACTICE AND
NEW ROLES FOR INFORMATION PROFESSIONALS.**

By

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Abstract

Over the past few years businesses across all sectors including energy industries have actively adopted data-driven strategies to address issues and provide solutions to problems. Considering the minimal studies conducted on RDM services, policies and practices in Nigeria, this literature review draws attention to the drivers of RDM policies and practices of other countries succeeding in providing RDM services with the view of understanding why it needs to be adopted to manage data produced by researchers in Nigeria's energy sector and how RDM services offers new potential roles for information professionals. It was recommended that Nigeria can learn from other countries' experiences while developing their own RDM policies and services. In addition, Information professionals must be flexible in adapting to the changes that might occur in the structural organisational culture of the library due to the new roles being introduced to provide support for research data management services.

Key words: Research data management, Data management services, Research data, Information professionals, Energy research institutes.

Introduction

Current research activities in most disciplines are being propelled by the rich availability of data. The volumes of data used and created through research are increasing exponentially because the modern-day technologies used for creating and capturing data are becoming more affordable and easily accessible to researchers (Kahn et al.,2014;Cox et al., 2019). This situation propelled the idea of the need to manage research datasets. Research data management (RDM) according to Whyte and Tedds (2011, p.1) can be defined as “the organisation of data, from its entry to the research cycle through to the dissemination and archiving of valuable results.”

The energy production industry has not been exempted from this data deluge experienced across many disciplines, as well as in the economy and society at large. Several works in the literature acknowledge that the oil and gas industry, in particular, generates large amounts of

datasets and give justifications as to why data should not be considered as descriptive information about physical assets but as something that is valuable in and of itself that can be harnessed for future growth and development of the energy sector (Damilare, 2019; Perrons & Jensen, 2015). Some of the rationales they give include quality decision-making and effective operational performance (Edehe, 2007; Sangvai, 2013).

To find solutions and enhance the productivity of the sector, major private and government-owned energy companies in Nigeria such as the Nigeria Liquefied Natural Gas Limited (NLNG), Nigeria National Petroleum Cooperation (NNPC), Petroleum Technology Development Fund (PTDF), and Shell engage in oil explorations and award scholarships to research programs focused on the energy sector. However, as the size of the datasets that are being generated through these various research activities continues to grow, it also becomes increasingly difficult to capture them for curation, preservation, and reuse. Furthermore, this makes it difficult to identify the return value or justification for the scholarships that are being offered. Also, rapid advancement in information technology adds to the vulnerability of the data as storage devices used in storing these datasets become inaccessible over time due to technology obsolescence (Cox & Pinefield, 2014).

Studies reveal that if deliberate actions are not being taken to curate and preserve research results, then data that has been gathered with a great deal of effort will all be lost; hence, to continue to harness the information and knowledge produced through these studies for the benefit of the industry, research data needs to be properly managed (Atkins et al., 2003). According to Edehe (2007), the Nigerian oil and gas industries, through proper data management, need to optimise their data quality and information exchanged between management groups and project teams in order to enhance their ability to make critical technical and business decisions. Therefore given the low-level awareness of RDM services and lack of any known RDM policy and practice in Nigeria, this paper will highlight other

countries' experiences in developing RDM policies that have successfully met the demands of the funders, institutions, and researchers' needs with a view to understand the importance and need for a policy framework for managing data generated through research processes in the Nigeria energy institutions and the provision of RDM services as a potential new role for information professionals in the country. Furthermore, the majority of the studies on data in the energy, oil and gas industries are mostly concerned with the issue of "big data". Big data is defined as the term used in describing "the application of new tools and techniques to digital information on a size and scale well beyond what was possible with traditional approaches" (Perrons & Jensen, 2015).

On the other hand, this particular study will be focusing on datasets and publications generated through research activities. Research data can be considered as a subset of big data but the ideology of data management applies to both concepts. The purpose of this review is to reveal the need to manage research data created in Nigeria's energy, oil, and gas institutions given the volume of research being conducted in the energy sector. The objectives of this study are to: highlight the key factors influencing the creation of RDM policies and services in different nations; highlight problems encountered in RDM service delivery; and identify key requirements for information professionals to successfully manage research data services.

Literature Review

Drivers of Research Data Management

Managing research data also known as Research Data Management (RDM) can be described as the process of organising data, right from its entry point through to the entire research cycle including the dissemination and archiving of valuable results (Whyte & Tedds, 2011). The need and importance of RDM have gained global recognition and research bodies in countries such as the UK, Australia, the US, and Canada have set up policies that mandate

that all research proposals must be accompanied by a data management plan, to ensure that valuable data are produced, especially from funded research programmes, are curated, preserved and made accessible for reuse (Khan et al., 2014; Steeleworthy, 2014). Furthermore, the UK research integrity office code of practice (UKRIO), (2009) states that data management practice provides an avenue for assuring research integrity. Whyte and Tedds (2011) also states that data management paves the way for the advancement of research efficiency and instigates international collaboration. In addition, good research data management practice aims to ensure reliable verification of results and allows new and innovative studies to be developed from existing information or data-set. With this in place, it becomes possible for research bodies and institutions to realise the investments in all funded research (JISK, 2014).

There are several constraints inhibiting the effective delivery of RDM services such as the availability of institutional data management infrastructure, awareness, skills, and provision of security measures for sensitive datasets and others. However, in spite of these challenges, countries that are leading in RDM services are driven by one main goal which is developing RDM policies. Research funding institutions such as Research Council UK (RCUK) in the United Kingdom and National Science Foundation (NSF) in the United States developed policies that made having a data management plan mandatory for all government-funded research. Likewise, information institutions, particularly research and academic libraries, who are taking front roles in key issues concerning RDM are also leading in creating RDM policies. The essence of creating RDM policies is to make it possible for institutions to provide the technology, resources, and staff structure required to reap the benefits of the knowledge and information generated through research data.

Research Data Management in Nigeria

Africa is gradually waking up to the issue of data management with articles documenting RDM practices in several African countries, especially South Africa, Zimbabwe, and Ghana. The documentation of RDM activities in Nigeria is extremely minimal and the few publications that exist give a narrow overview of its awareness and practices among stakeholders. A research article by Anyaoku (2019) for instance investigated RDM practices in Nigeria medical library facilities across the country. While the article successfully investigated the librarians' knowledge and awareness of RDM, the findings were one-sided and lacked depth because they failed to include information about the parent organisations as well as the users' (researchers) demands and needs for data management. Furthermore, although there exist several articles advocating for data management in the Nigeria oil and gas industry, but most are focused on the issues of big data and none of the studies reported the existence of any data management policies or practices in any of the energy institutes or organisations.

The Research Mandates of Nigeria Energy Institutes

There are several research centres established by the federal government of Nigeria that have been given the mandate to train and develop manpower and carry out research activities in oil and gas exploration and production as well as other energy-related fields. Many of these research centres operate independently as federal institutes, while some are domiciled in federal universities or federal parastatals. They include the following: National Energy Research Centre and Development, University of Nigeria, Nsukka (NERCD-UNN); Petroleum Development Fund (PTDF) Research and Documentation Division; Nigeria National Petroleum Corporation (NNPC) Research and Development Division; Nigeria Liquefied Natural Gas (NLNG) Centre for Gas, Refining and Petrochemical Engineering, University of PortHarcourt (CGRP-UNIPOINT); Centre for Petroleum Energy Economics and Law (CPEEL), University of Ibadan; and the Institute of Oil & Gas Research and

Hydrocarbon Studies (IOGRHS). While the above list is by no means exhaustive, it does indicate that the Nigerian government recognizes the importance and need for research in the field of oil and natural gas, and other energy industries. The visions and missions of these institutes resonate around finding solutions to operational and technical problems in the petroleum industry through the applications of results from scientific research and new technological innovations (NNPC, 2019). Also, to develop a centre for energy research and development in renewable and alternative energy technologies responsive to the challenges of energy and economic needs of Nigeria (NERCD-UNN, 2017). Another is finding additional methods of using resources generated from oil and natural gas to achieve a competitive edge, increase in value and greater economic impact (NNPC, 2019).

The consequence of having multiple organisations conducting research activities in a particular field or sector is the generation of large volumes of data. However, if these data are not intentionally curated, preserved, and managed by professionals they will be lost; resources used in conducting the study will be wasted and the missions of the organisations sponsoring research may be compromised. Therefore, it has been argued by Whyte and Tedds (2011, p.7) that “institutional policy development is required as a basis for coordinated action on data management. The objective is no different from that of research itself: to benefit science, scholarship and provide wider social and economic impacts.”

Research Data Management Services- New Roles For Information Professionals

Although studies reveal that RDM development is a shared and collaborative effort between the library, IT, and research administration, nevertheless, the reality in most institutions is that the library appears most concerned about it (Cox et al 2019, p.128). New roles that have emerged as a result of the development of RDM policies and services include the following: Data Librarian, Geographic Information System Librarian or (GIS) Librarian,

Digital Research Librarian, Data Management Specialist, Data Repository Manager, and others (Shearer & Schmidt, 2016, p.4).

The study conducted by Cox and Pinfield (2014, p.304) involving library staff in UK higher education, research institutions, and professional bodies such as RESEARCH-DATAMAN and JISC-Repositories revealed that librarians perceive providing research management services as a significant priority. The study further revealed that libraries are developing RDM policies and services in anticipation that it will form an integral part of their role in the future. Hence, libraries' perception of research data services as a potential role is becoming an additional driving force for research data management besides funders' policies and requirements (Cox et al., 2019).

According to Shearer and Schmidt (2016), in addition to having some level of background knowledge of subjects or disciplines to support research data management, librarians are required to have competencies in the following area: providing access to data, advocacy, and support for managing data, and managing data collections. Some of these competencies when further broken down include knowledge of metadata schemas, database design and structure, database repository and storage platform, ability to select and appraise datasets, skills in digital preservation activities, and application of forensic procedures in digital curation, among others.

Despite detailed identification of the skill sets required for successful RDM service delivery, studies reveal that the major constraints being faced by most institutions revolve around securing adequate institutional research data infrastructure for the preservation, discovery, and reuse of datasets generated in previous studies conducted by other researchers, and technical skills, particularly data analysis, data impact analysis, auditing, and metadata

Conclusion

Khan (2014) recommended South Africa learn from the experiences of other countries while developing their own RDM policies, Nigeria energy research institutions can also do likewise. In addition, Nigerian information professionals should be willing to embrace the potential cultural shift they are likely to experience in the library organisational structure while creating data management roles. Further suggestions made by Khan include using an 'iterative' approach and incorporating all stakeholders within the institution that have a role in supporting RDM as the most effective way for developing the RDM policy to avoid redundancy and conflict of interests. Another important consideration for RDM service delivery in all sectors or institutions is identifying the department (Library, IT, or Research Services) that will play the lead role in designing and delivering research data management policies and services (Khan, 2014).

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