Building a Culture for Research Data Management in Kenya: A Scoping Review of the Early Indicators

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abstract: Effective research data management (RDM) is essential to modern scientific investigations. As the volume and complexity of research data increase, researchers, research institutions, and countries are pressured to improve data management practices to ensure transparency, reproducibility, sharing, and reuse of their findings. Researchers and institutions in Kenya, like those in many other developing countries, have begun to adopt the practice. This review examines the early indicators of improved research data management practices in Kenya to identify leaders who would drive the culture of RDM and thus improve research output.

This study adopted a qualitative design methodology. Relevant information in studies, reports, and policies was retrieved from websites, electronic databases, institutional repositories, and gray literature for analysis to identify the early indicators of RDM in Kenya. The data were then analyzed thematically using key variables identified by the RDM Capability Maturity Model: legal and policy provisions, information technology (IT) infrastructure, support services, and data literacy.

The content analysis found notable RDM activities among researchers and some research institutions, such as the Kenya Medical Research Institute (KEMRI), the International Livestock Research Institute (ILRI), and the Kenya National Bureau of Statistics. Notable early indicators of RDM activities included data repositories, data management policies, and multidisciplinary datasets archived in data repositories. Activities at the institutional level are limited, especially in universities. This implies that RDM in Kenya is still in its infancy.

Introduction

In pursuing scholarly inquiry, data are collected and analyzed to inform research conclusions and recommendations.[1] Researchers should appropriately manage data because of such benefits as the possibility for reuse, sharing, and easy data retrieval. According to Louise Corti and her coauthors, research data refers to all information collected, observed, generated, or created during all stages of research. The data could be in many forms and formats, depending on the discipline, research type, and method used.[2] Because of the complexity and vast volumes of data generated in research, proper research data management practices should be observed at every stage of the research process. Data must be well documented during the collection, processing, analysis, and sharing phases. Data management plays a crucial role in ensuring that research projects are backed with data that have integrity, are accessible, and can be preserved for posterity.[3]

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The practice of collecting, managing, and curating research data is not new. Historically, however, attention focused on completed scholarly works, such as theses, dissertations, reports, monographs, journal articles, and conference proceedings, rather than on research data.[4] Consequently, much research data was difficult for researchers to reuse or share.[5] Data management practices have rapidly evolved and improved since the early 2000s, particularly in developed countries. Effective RDM practices go a long way toward making the research process cost-effective and sustainable. Having researchers share and reuse data that have been already collected cuts down the cost significantly. To facilitate reuse and sharing, however, researchers must effectively manage and preserve the data during and after the project.[6]

Today, RDM practices are widely accepted. This acceptance has been attributed to increased funding and publishing requirements, growing recognition of the value of open science, the increased use of computers, and improved data management technologies. Further, investment in information communication technologies (ICT) infrastructure has increased, more laws have been enacted to address the challenges associated with data, and RDM support services have been established to help researchers manage and share their data effectively.[7] In most of these initiatives, developed countries have taken the lead. RDM practices and programs are incorporated into the national and institutional research policy frameworks and programs in such countries. According to Rong Tang, Zhan Hu, Nicole Henry, and Ashley Thomas, although some institutions and countries globally have made notable strides, developing countries still have far to go. They are handicapped regarding RDM, partly owing to undeveloped policies, poor IT infrastructure, and inadequate data literacy among stakeholders.[8]

RDM practices in many developing countries are still in their infancy.[9] RDM in those countries needs to become more systematic because there is no standardized or institutionalized approach to managing research data.[10] RDM remains undeveloped in

virtually all countries in Africa except South Africa. Much data generated in universities in developing countries is at risk of getting lost and is difficult to reuse or share because it is not organized correctly. A 2018 survey by Elisha Chiware and Deborah Becker of southern African countries (Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe) on the readiness of their academic and research libraries for RDM revealed that most libraries had taken only the first steps.[11] This finding mirrors that of Bright Kwaku Avuglah and Peter Underwood, whose study at the University

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of Ghana revealed that the institution's capabilities for RDM were underdeveloped.[12] Inadequate research on the subject was identified by Tom Kwanya as one of the significant reasons why RDM needs to improve in Africa.[13] Several studies acknowledge, however, that researchers and institutions now recognize the value of data management and face pressure from other stakeholders to adopt effective data management practices. Despite the low volume of research on RDM in Africa, several efforts are underway to improve data management.[14]

Like other African contexts, Kenyan universities and research institutions are unprepared for RDM. Kenyan researchers and institutions, like their international counterparts, are under increasing pressure to manage research data effectively to compete for grants, publish in prestigious journals, and achieve high visibility and impact. Several laws and policies have been formulated in Kenya to enhance general data management and, by extension, research data management. Despite the increased appreciation for data management, most researchers and research institutions have only begun to engage in the best RDM practices.[15] According to Everlyn Anduvare and Stephen Mutula, RDM was nonexistent in 2019 in private universities in Nairobi, the capital of Kenya.[16] In the same year, Amadi Allela and Naomi Mwai assessed RDM practices at the Technical University of Kenya in Nairobi. They found that data management happened only minimally at the individual researcher's level and needed to become more cohesive.[17] These findings corrobo-

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rate a 2015 study by Irene Moseti, who established that most researchers in Kenya seldom use repositories to archive their research data, even though the majority agree that data should be preserved for future use.[18]

For an institution like a university to operationalize research data management, the institution and its library must be RDM-ready in many aspects. They must have the necessary legal and policy framework and the essential human, financial, and physical resources.

Theoretical Framework

This review was guided by the Capability Maturity Model for research data management developed by the Australian National Data Service. According to this model, the

key elements required for RDM are (1) institutional policies and processes; (2) an IT infrastructure, which refers to the hardware, software, and other facilities that support data-related activities; (3) support services, including people and other means of providing advice and assistance, such as online toolkits and research data interviews; and (4) the ability to create and manage datasets and metadata to allow easy retrieval, sharing, and reuse for both internal and external purposes.[19] The maturity level of RDM services can be measured by assessing the legal and policy framework, the IT infrastructure, the support services, and the data literacy of the researchers.[20]

Context of the Study

The review was limited to researchers and research institutions in Kenya. Since Kenya gained independence in 1963, almost all central government documents have identified research as a critical driver of development. Significant government efforts to support research include the 1965 Sessional Paper No. 10, which identifies agricultural research as a critical enabler of production and increased yield. A national development plan called Kenya Vision 2030, launched in 2008, proposes more significant use of science, technology, and innovation to boost productivity and efficiency across the "three pillars"—economic, social, and political. The Universities Act of 2012 established the Commission for University Education to regulate and assure quality higher education to achieve global competitiveness. The Science, Technology and Innovation Act, 2013 created the National Commission for Science, Technology, and Innovation. The commission, often abbreviated as NACOSTI, regulates and assures quality in science, technology, and innovation, as well as advises the government on research matters. The 2013 act also established the National Research Fund Kenya (NRF) with a mandate to mobilize, allocate, and manage financial resources to facilitate greater knowledge and innovation in all fields of science and technology.

Several government and nongovernmental institutions are actively involved in research in Kenya. According to NACOSTI, the country had 11 public and 9 private research institutions in 2022. The Commission for University Education reports 74 universities authorized to operate in Kenya, including 31 chartered public universities and 21 chartered private universities. Most of these institutions face challenges when it comes to research funding.[21] Therefore, efficient data management must be adopted to ensure that their investment in research returns as much as possible.

Problem Statement

Even though most Kenyan researchers and research institutions recognize the need to manage research data effectively, evidence of effective data management remains limited. Adoption is slow and uncoordinated, with best practices often not shared among stakeholders. To improve and optimize research data management in Kenya, this paper will examine the early indicators of RDM practices in the country. This paper proposes strategies to enhance data management in the country and share best practices from RDM leaders. The findings will inform policymakers, funding agencies, research institutions, and researchers themselves, guiding the development of policies, training programs,

and infrastructure improvements to ensure robust RDM in Kenya. The objectives were (1) to identify early indicators of research data management best practices in Kenya and (2) to determine patterns from the preliminary indicators of Kenya's RDM practices.

Methodology

According to Zachary Munn and his coauthors, a scoping review is a comprehensive and structured approach to conducting a literature review on a specific research topic or question. It involves systematically searching, selecting, and summarizing existing literature to provide an overview of the available evidence on a subject and to identify gaps in knowledge.[22] This study adopted a qualitative research design to identify early indicators of research data management in Kenya. According to John Creswell and J. David Creswell, qualitative research involves exploring and understanding the context and perspectives of participants through nonnumerical data, such as content analysis, interviews, and observations.[23] A predefined search strategy was employed to identify relevant information from websites, databases, and other sources of information, such as research papers, reports, conference proceedings, and other scholarly materials.

In this study, the data were collected from publicly available online sources in Kenya. An advanced Google search identified a list of websites likely to contain information related to RDM in Kenya. These included government agencies, academic institutions, research organizations, funding bodies, and international organizations working in data management. Information was retrieved from articles, blog posts, reports, guidelines, and any other webpages that discuss RDM practices in Kenya. Data were retrieved about four RDM indicators suggested by the Capability Maturity Model: the legal and policy framework, ICT infrastructure, support services, and data literacy. Table 1 lists the key search terms used to identify the significant RDM indicators in Kenya.

The search was limited to the years from 2000 to 2023. The retrieved information was then screened to select the data that meet the inclusion criteria. The study sought to establish any early indicators or emerging practices related to RDM in Kenya, such as policies, tools and infrastructure, and best practices that have gained attention in the research community. The study's findings were then summarized and organized to provide a clear overview of the current state of RDM practices in Kenya, based on online sources. The implications of the identified trends and early indicators are then discussed, as well as how these findings can inform and improve practices in Kenya and their impact on the research ecosystem.

Results and Discussion

The Legal Framework for RDM in Kenya

For this study, RDM legal and policy framework refers to laws, regulations, rules, and guidelines at government or institutional levels to provide a systematic and organized approach to research data management. Research data often contain sensitive personal information and must be protected to ensure privacy. Further, research data are subject to intellectual property laws, such as copyright and patent laws; thus, the originators' rights must be protected. The legal framework enables researchers to comply with legal and policy requirements from funders, publishers, and governments.[24]

Table 1.

Search terms used to identify research data management (RDM) indicators in Kenya

RDM indicator	Key terms searched
Legal and policy framework	Data framework, Data Management Act, data management policy
IT infrastructure	Data repositories, data infrastructure
Support services	Data librarian, e-research support, research data management
Data literacy	Open data, data management plan, research data management

The findings showed no evidence that Kenya has signed any international treaties or agreements related to data management or protection. Several pieces of legislation directly or indirectly govern data management in the country, however. These include the 2010 Constitution of Kenya; the Kenya Data Protection Act, 2019; the National Cybersecurity and Critical Infrastructure Protection Act of 2014; the Access to Information Act, 2016; the Open Data Policy 2015; the Science, Technology and Innovation Act of 2013; the National Information, Communications and Technology Policy 2019; the Universities Act, No. 42 of 2012; and the Kenya Information and Communications Act, 2013. Several institutions responsible for data management in the country have been established based on these laws. The major body governing data management in Kenya is the Office of the Data Protection Commissioner, established by the Data Protection Act of 2019 to provide a framework for protecting personal data and to set out the rights of individuals concerning their data. The Communications Authority of Kenya was established by the Kenya Information and Communications Act, 1998 to regulate data use and ensure compliance with international data protection standards.

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More specific legislation that deals with research is NACOSTI's Science, Technology and Innovation Regulations, 2014, which concern the country's research, science, technology, and innovation. The agency recognizes the importance of good data management practices in research and encourages researchers to adopt best practices for data management. An examination of recent applications for funding indicates that, unlike other funders, the National Research Fund Kenya does not require data management plans (DMP) from applicants. As a result, RDM is left to the efforts of individual researchers and institutions. The lack of a legal framework to manage research data in the country makes RDM an urgent issue for Kenyan institutions and researchers.

According to Mabel Imbuga, effective data management in an institution must be guided by a policy anchored to other laws, such as international or regional treaties and national laws.[24] Some institutions and government agencies in Kenya have developed data management policies and guidelines that direct researchers in the respective institutions. In addition to KEMRI and ILRI, research institutions in Kenya with data management policies include the African Population and Health Research Center and the World Agroforestry Centre. Most universities lack an independent RDM policy, but instead, cover various aspects of data management in other policies. There was also evidence of active ethical review boards at some institutions that evaluate, review, and make decisions on the scientific and ethical merits of research proposals, especially data management.

Traditionally, researchers self-regulated in terms of how to collect and manage data. Because of increased security threats, the dangers of data misappropriation, and the complexity of research, however, there is a need to have legal instruments and policies for effective research data management.[25] So few institutions in Kenya have RDM policies in place that most of the country's research data are insecure and subject to misappropriation. To address this challenge, research stakeholders, including funders and governments, should ensure that research institutions, especially universities, create laws and procedures that encourage RDM. Unlike most developed nations that have established national RDM frameworks to serve as guidelines for managing data, there is no specific national legislation in

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Kenya. This gap can make it difficult for individual researchers and institutions to manage their research data effectively. NACOSTI provides for establishing ethical review boards to approve research. A review of the information online, however, shows that the ethical review boards do not focus on methodology and ethical issues such as consent and data handling and do not outline data preservation and curation.

IT Infrastructure for RDM in Kenya

The IT infrastructure for RDM includes the systems, tools, and software elements that must be integrated into a unified framework that can effectively support data management at all stages of the research process and life cycle of the research data.[26] Effective RDM requires a robust and secure IT infrastructure that provides adequate storage capacity to store and back up data; data security to protect data from unauthorized access, modification, or loss; software to manage, organize, and document research data; and data sharing and collaboration platforms. The development of inexpensive and easily accessible data capture equipment, available to academics, has significantly increased the volume of data produced. While such devices may have made data generation easier, the vast amount and scattered nature of the data have magnified the issues associated with collecting, curating, storing, and reusing the data.[27] There is a need to ensure appropriate tools and systems to help the researcher create, organize, manage, preserve, curate, and share data at all research stages.

For effective RDM, researchers must be supported with necessary infrastructure such as data repositories, Internet connectivity, and adequate hardware, like computers and laptops. The review revealed that most research institutions in Kenya have a good ICT infrastructure regarding general hardware, software, and Internet connection. The Kenya Education Network (https://www.kenet.or.ke/) plays a significant role in providing Internet connectivity to research institutions and facilitates research, sharing, teaching, and collaboration with other institutions. According to the Kenya Education Network, nearly all Kenyan universities in 2023 were connected using a high-speed, protected

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fiber link at speeds of 1,000 or 10,000 megabytes per second. Many users need help, however, accessing high-speed Internet because of poor campus networks and limited connection in students' learning spaces, including libraries, lecture rooms, and hostels.

Kenya has made efforts to promote the adoption and implementation of open access institutional repositories. Most research institutions have repositories to archive different types of research output. According to Louise Bezuidenhout, Kenya has the second-highest number of institutional repositories in Africa.[28] There is little evidence, however, that research data are archived in the institutional repositories. Further, Kenya needs more stand-alone data repositories, which are essential in facilitating effective data management. The Registry of Research Data Repositories lists five Kenyan repositories: KWTRP (KEMRI Wellcome Trust Research Programme) Research Data Repository (https://dataverse.harvard.edu/dataverse/kwtrp), GeoCommons Archive (http://geocommons.com/), DEWA/GRID (Division of Early Warning and Assessment/Global Resource Information Database)-Geneva (https://unepgrid.ch/en/), Kenya Open Data (https://www.opendata.go.ke/), and the World Agroforestry Centre-ICRAF (International Council for Research in Agroforestry) Dataverse (https://dataverse.harvard.edu/dataverse/icraf). Other data repositories in the country that are not listed in the Registry of Research Data Repositories include Open Data, Kenya Open Data, the African Population and Health Research Center's Microdata Portal, and the Kenya National Bureau of Statistics.

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A Google search revealed a significant number of datasets associated with Kenya that are deposited or linked to online databases accessible nationwide. Among them were Dimensions (https://www.dimensions.ai/), AfricArXiv (https://info.africarxiv.org/), Zenodo (https://zenodo.org/), Figshare (https://figshare.com/), and the Global Biodiversity Information Facility (https://www.gbif.org/).

From the findings, efforts to preserve research data in Kenya are gaining momentum. Several institutions have started investing in data repositories and archiving systems to

ensure the long-term accessibility and usability of datasets. The critical IT infrastructure for data management includes data repositories. They play a central role in facilitating data sharing and reuse by providing data discovery services, unique digital identifiers, and metadata needed for data citation.[29] According to the Registry of Research Data Repositories, more than 2,000 open data repositories are freely public for researchers. Despite this, the amount of research data deposited from Africa is barely 2 percent of the total generated on the continent.[30] According to the Registry of Research Data Repositories, no African university has such a repository. These findings agree with those of Anduvare and Mutula, who, in their 2019 study,

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established that the IT infrastructure for RDM in the private universities in Nairobi was rudimentary.[31] Even with few data repositories, a search in the Dimensions database indicated over 45,000 datasets associated with Kenya, while a search in Zenodo retrieved over 12,000 datasets, and Figshare had over 14,000 datasets. Much is already happening even with the limited infrastructure in the country.

For effective data management, research institutions need to establish a robust, secure, and unified infrastructure that can support data management at all stages of the research process and life cycle.[32] This infrastructure should be supported by adequate capacity to store and back up research data. Further, appropriate tools and systems are necessary to help the researcher create, organize, manage, preserve, curate, and share data at all research stages. A reliable Internet connection that can facilitate data sharing, especially for large datasets, should also be provided.

Managing research data requires a robust infrastructure to ensure data integrity, accessibility, and security. Building a solid RDM infrastructure in Kenya will require collaboration among government agencies, universities, research institutions, and international partners. It is essential to tailor the infrastructure to the needs and challenges the Kenyan research community faces while aligning with global best practices. According to John Lewis, having an appropriate IT infrastructure is crucial for effective RDM, as it provides the necessary tools and resources to store, protect, manage,

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and share research data securely.[33] A 2018 study by Elisha Chiware and Deborah Becker established that a lack of extensive IT structures hindered researchers' RDM practices in the institutions studied.[34] Fredrick Odhiambo Adika and Tom Kwanya attributed poor data literacy to weak and undeveloped RDM infrastructure.[35]

Support Services for Effective RDM in Kenya

The support services required for effective RDM include the technical competencies and skills to carry out the complex exercise of research data management. Researchers need to understand the legal and ethical issues, master the ever-changing IT infrastructure, and have the skills to make datasets with appropriate metadata. According to Rong Tang, Zhan Hu, Nicole Henry, and Ashley Thomas, researchers require support in RDM planning, data sharing and dissemination, data preservation, data discovery and access, creation of metadata, data visualization, data organization, and data curation.[36] There is, therefore, a need to provide support services that can help researchers effectively manage their data, improve the quality and reproducibility of research, and ensure compliance with funding agency and institutional requirements.

Various university divisions and personnel support researchers in multiple ways. Research divisions, university libraries, IT divisions, ethical review boards, and other departments provide support services to researchers in Kenya. Library websites reveal that researchers are supported with training on emerging issues and with access to information tools and products such as anti-plagiarism software, citation and referencing tools, and print and electronic information resources. Many universities offer workshops and training to enhance researchers' skills in general research practices, such as grant proposal writing and how to select and publish in good journals. Some institutions have made notable efforts toward the development of open science and data management. For example, the Committee on Data of the International Science Council (CODATA), in collaboration with Jomo Kenyatta University of Agriculture and Technology (JKUAT) and UNESCO, held a two-day International Workshop on Open Data for Science and Sustainability in Developing Countries in Nairobi in 2014. Since then, JKUAT has hosted several webinars on topics relating to data management to enhance the administration, accessibility, quality, and dependability of data crucial to all scientific and technological domains. Through this collaboration, JKUAT (the CODATA member organization for Kenya) has established information and communications technology to promote a culture of good practice in open data. The Ninth Annual Heads of Institutions Forum in 2017 in Mombasa dealt with the theme "Implementing Open Access Research Data Policies in Kenyan Research Institutions—The Case of JKUAT." The Global Biodiversity Information Facility-Kenya has held several webinars and meetings for researchers, data scientists, conservationists, students, and other parties interested in biodiversity research and data management.

The Kenya Education Network (KENET) has been at the forefront of building critical infrastructure and capacity for open science and data management in Kenyan universities and research institutions. Some of the infrastructure for data support at KENET includes data centers, Internet connectivity, and disaster recovery services. The Training Centre in Communication in Africa (TCC Africa) has held several capacity-building sessions for researchers to improve and pro-

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mote open science in Kenya. The Open Data Initiative, led by the government of Kenya in partnership with development partners, aims to make data more accessible to citizens, businesses, and researchers through the creation of an open data portal.

More support services are needed in developing countries like Kenya, where RDM services are still in their infancy. In the United States, Canada, and the United Kingdom, where RDM support is more mature, support structures such as RDM support desks within libraries and dedicated data librarians offer RDM services.[37] Libraries are well placed to offer RDM support services because, traditionally, they have played a key role in supporting research by providing information retrieval, information literacy, and selective dissemination of information. There is, however, no evidence of a dedicated RDM support desk within libraries and websites in Kenya or dedicated personnel such as data librarians to offer RDM services.

According to Graham Pryor, the new function of assisting researchers in data management presents a unique opportunity for academic libraries to become active participants in their institutions' knowledge generation cycle.[38] Librarians must undergo urgent retooling, however, to offer data management support services effectively so that the research community can benefit more fully from their knowledge management skills. Librarians need to learn more about these services on campus or through seminars and professional conferences.

Data Literacy among RDM Stakeholders in Kenya

In this study, data literacy was understood to mean the ability to create, manage, manipulate, share, and reuse research data. Since RDM is a multidisciplinary, technologically oriented, complex practice, all the RDM stakeholders require intensive skills and continuous training to enable them to work with and effectively manage data. Traditionally, the responsibility to create, organize, preserve, and share research data rested mainly with the researchers. Since RDM is a complex process, however, all stakeholders, including librarians, ICT staff, and research support staff, should be data literate to offer effective assistance.[39]

A bibliographic review of the few studies on RDM in Kenya indicated that the country's data literacy levels are still low. According to Anduvare and Mutula, RDM was nonexistent in private universities in Nairobi in 2019.[40] In the same year, Amadi Allela and Naomi Mwai assessed the RDM practices at the Technical University of Kenya. They found that practices were minimally happening at the individual researcher's level, but needed to be more cohesive.[41] These findings corroborate an earlier study in 2015 by Irene Moseti and Stephen Mutula, who established that most researchers in Kenya hardly use repositories to archive their research

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data, even though the majority agree that data should be preserved for future use.[42] A 2020 case study of lecturers at Strathmore University in Nairobi by Fredrick Adika and

Tom Kwanya showed that most participants had challenges related to data sharing, especially in open access platforms and data legislation.[43] Similar conclusions were reached by Emily Ng'eno, who observed that RDM practices were still poor in 2018 in agricultural institutes in Kenya.[44] These studies illustrate that data literacy levels remain low in Kenyan universities. There is also limited evidence of forums such as webinars, workshops, conferences, and training to improve data literacy. The knowledge and skills required for effective RDM are not taught in universities or graduate schools. Poor data literacy skills can lead to problems such as poor data management, lack of reproducibility, and difficulty in sharing and reusing data. Few research institutions require data management plans from researchers before doing research or provide user guides to aid researchers in preparing such plans.

The limited evidence of comprehensive and accessible training programs on data literacy for researchers implies that researchers are left on their own. There is, therefore, a need to incorporate data literacy into academic curricula at all levels to ensure that researchers receive foundational training in data handling, analysis, and interpretation. Workshops, seminars, and webinars should be organized to give researchers hands-on training experiences. Most research funders worldwide have adopted or are in the process of adopting guidelines requiring grant recipients to submit data management plans for official approval and to keep their data by those plans. Kenyan researchers need to learn how to prepare quality data management plans if they are to compete for grants.

Conclusion and Recommendations

This assessment highlights an urgent need for coordinated measures to improve Kenya's research procedures and output. The findings emphasize the significance of developing a comprehensive RDM framework that includes data collection, storage, sharing, and preservation. Finally, successfully establishing a research data management culture in Kenya will boost research productivity, advance scientific integrity, foster innovation, and contribute to global knowledge.

Based on the review, this study recommends the following:

1. An RDM framework should be developed outlining the steps and actions required to entrench a culture of research data management in Kenya, considering the roles of different stakeholders and including policy improvements, capacity-building efforts, and awareness campaigns.

2. Research institutions should develop and implement comprehensive RDM policies that align with international best practices and standards.

3. Research institutions should invest in technological infrastructure, including data repositories and collaborative platforms, to facilitate efficient and secure data management.

4. Programs and services should be implemented to support researchers, graduate students, and research support staff to enhance their skills and awareness of effective RDM practices.

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