Infopreneurial Opportunities in Research Data Management Services in Nigerian University Libraries: A Review

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Abstract

In light of the quick rise of digital research outputs and growing stress on open science, research data management (RDM) is increasingly becoming an essential part of academic communication and university research support services globally. Academic librarians in Nigerian university libraries are increasingly tasked with the provision of services to organize, store, preserve, access and share research data. The paper will examine infopreneurial opportunities in research data management services in university libraries, Nigeria. This will show how librarians can shape RDM services as innovative and entrepreneurial information-based initiatives that will contribute to institutional research productivity and professional sustainability. The main aim of the paper is to review the existing literature on research data management, infopreneurship and academic librarianship to identify some key and potential areas of opportunities such as data curation, metadata and repository management, digital preservation, data literacy training, research consultation and open access support services. The paper will also illustrate the benefits of these services such as generation of income, increasing visibility of research output, enhancing collaboration among scholars, and greater relevance of librarians in digital knowledge economy. Despite these efforts, the full implementation of RDM policies and practices is hampered by insufficient ICT infrastructure; funding; absence of institutional RDM policies; technical competencies; and stakeholders' low awareness. The paper affirm that Nigerian university libraries must strategies for capacity-building initiatives, strengthen digital infrastructure, and promote entrepreneurial librarianship to seize opportunities in research data management services. This implies that RDM provides a feasible means of broadening the scope of infopreneurial practice in Nigerian university libraries and positioning librarians as strategic partners in research and innovation.

Keywords: Research Data Management, Infopreneurship, University Libraries, Academic Librarians, Nigeria.

Introduction

The rapid transformation of scholarly communication in the digital era has significantly redefined the role of academic libraries. Libraries are no longer limited to the collection and dissemination of printed resources but are now expected to actively support the entire research lifecycle, particularly in data-intensive environments (Cox & Pinfield, 2014). Research Data Management (RDM) refers to the structured organization, storage, preservation, sharing, and reuse of research data throughout the research lifecycle (Whyte & Tedds, 2011).

The research data lifecycle includes stages such as data collection, processing, analysis, storage, preservation, sharing, and reuse. Effective RDM ensures that data remain accurate, accessible, secure, and reusable over time (Jones, 2018). With the increasing adoption of open science practices, research funders and institutions now require researchers to manage and share their data responsibly (European Commission, 2016).

Parallel to this development is the emergence of infopreneurship in Library and Information Science, which refers to the entrepreneurial exploitation of information services for value creation and income generation (Aina, 2007). Infopreneurship positions librarians as knowledge entrepreneurs who design and deliver innovative information services that respond to emerging research needs.

In Nigerian university libraries, where funding constraints and increasing research demands persist, integrating infopreneurial approaches into RDM services provides a strategic opportunity for sustainability and relevance.

Research Data Management Services in University Libraries

Research Data Management (RDM) services in university libraries represent a strategic shift in the role of librarians from traditional information custodians to active partners in the research process. These services support the entire research data lifecycle and ensure that data are properly created, organized, preserved, shared, and reused for scholarly advancement. In academic environments, especially with the rise of data-driven research, university libraries have become central hubs for managing research data effectively (Cox & Pinfield, 2014; Tenopir et al., 2012). The key components of RDM services are:

1. Data Collection Support and Research Assistance

Data collection support involves assisting researchers in designing, organizing, and implementing effective strategies for gathering research data. Librarians contribute by advising on appropriate data collection tools such as surveys, interviews, observation schedules, and digital instruments. They also support researchers in selecting suitable sampling methods, ensuring consistency, and improving data quality from the onset of research.

Beyond technical support, librarians provide research assistance by guiding scholars on data ethics, informed consent, and compliance with institutional and funder requirements. This ensures that data collection processes align with legal and ethical standards, especially in studies involving human participants. According to Tenopir et al. (2012), librarians are increasingly involved in early-stage research planning, particularly in improving data quality and reproducibility through structured guidance.

2. Metadata Creation, Data Documentation, and Curation

Metadata creation and documentation are critical components of RDM because they provide the descriptive context that makes datasets understandable and reusable. Librarians assist researchers in applying standardized metadata schemas such as Dublin Core or discipline-specific standards to describe datasets accurately (Greenberg, 2009).

Data documentation includes recording essential details such as data origin, methodology, variables, file formats, and processing steps. This ensures transparency and facilitates future reuse of the data. Data curation goes a step further by actively managing datasets throughout their lifecycle cleaning, organizing, and enhancing them to maintain quality and usability.

Effective metadata practices significantly improve data discoverability and interoperability, which are essential for long-term research value (Wilkinson et al., 2016).

3. Data Storage, Preservation and Repository Management

Data storage and preservation services ensure that research data are securely maintained for both short-term use and long-term access. University libraries provide infrastructure such as institutional repositories, cloud storage systems, and digital preservation platforms to safeguard research outputs.

Repository management involves the organization, maintenance, and governance of digital platforms where datasets are deposited. Librarians ensure that datasets are properly catalogued, assigned persistent identifiers (such as DOIs), and stored in formats that support long-term accessibility.

According to Jones (2018), effective data preservation is essential for safeguarding research integrity and enabling future reuse, particularly in academic environments where data loss can significantly impact scholarly continuity.

4. Data Sharing, Access and Open Science Support

Data sharing services involve making research datasets available to other researchers and stakeholders for verification, reuse, and collaboration. This function is closely linked to the principles of open science, which promote transparency, accessibility, and collaborative knowledge production.

University libraries support researchers in selecting appropriate repositories, applying access controls, and complying with copyright, privacy, and licensing requirements. They also help implement data-sharing policies mandated by funding agencies and academic institutions.

The FAIR principles Findable, Accessible, Interoperable, and Reusable provide a widely accepted framework for ensuring effective data sharing practices (Wilkinson et al., 2016). By supporting open science, libraries enhance research visibility, reproducibility, and global scholarly engagement.

5. Research Data Literacy and User Training Services

Research data literacy refers to the ability of researchers and students to understand, manage, and use data effectively throughout the research lifecycle. University libraries play a key role in building these competencies through structured training programs and workshops.

These training services cover areas such as data management planning, metadata standards, data cleaning, ethical considerations, repository use, and data visualization techniques.

Librarians also train users on compliance with institutional and funder requirements regarding data management and sharing.

Tenopir et al. (2012) emphasize that many researchers lack adequate data management skills, highlighting the importance of librarian-led training initiatives. Through these programs, libraries strengthen research capacity and promote responsible data practices across academic communities.

Infopreneurial Opportunities within RDM Services

Infopreneurial opportunities within Research Data Management (RDM) services are rapidly expanding as university libraries transition from traditional support units into dynamic knowledge hubs within the digital and data-driven research ecosystem. Infopreneurship, which refers to the entrepreneurial exploitation of information and knowledge services for value creation and income generation, aligns naturally with RDM because research data have become a valuable scholarly asset with both academic and economic potential (Aina, 2007; Cox & Pinfield, 2014). In contemporary universities, especially in developing countries like Nigeria, librarians are increasingly leveraging RDM competencies to offer specialized, value-added services that support researchers while generating institutional and personal revenue. Infopreneurial opportunity within RDM includes research data management consultancy services, Data Management Plan (DMP) development services, metadata creation, data documentation, and curation services

Institutional repository management and data archiving services, research data analytics and visualization services, data literacy training and capacity-building programme and Open science compliance and FAIR data consultancy services.

Research Data Management consultancy services: Librarians with expertise in data lifecycle management can provide advisory services to researchers, research groups, and institutions on how to plan, organize, and manage their data effectively. This includes guidance on data collection methods, metadata standards, ethical compliance, and data governance frameworks. As funding bodies increasingly require structured data management practices, especially Data Management Plans (DMPs), librarians can offer consultancy services to assist researchers in meeting these requirements (Jones, 2018; Whyte & Tedds, 2011). This positions librarians as strategic partners in research projects while creating income-generating opportunities.

Provision of Data Management Plan (DMP) development services: Many international research grants now mandate detailed DMPs outlining how data will be collected, stored, shared, and preserved. Librarians can develop and sell customized DMP services to researchers and academic departments, ensuring compliance with funder expectations such as those of the European Commission and other global agencies (European Commission, 2016). This service is increasingly valuable in Nigerian universities seeking to attract international research funding.

M**etadata creation, data documentation, and curation services**: High-quality metadata enhances the discoverability, accessibility, and reusability of research data. Librarians can offer professional metadata design and dataset documentation services to researchers, ensuring compliance with standards such as Dublin Core or discipline-specific schemas. This improves the quality of institutional research outputs and enhances visibility in global research repositories (Greenberg, 2009; Wilkinson et al., 2016).

Institutional repository management and data archiving services: present strong entrepreneurial potential. Libraries can develop and manage institutional repositories for universities, hosting datasets, theses, and other scholarly outputs on a fee-supported or consultancy basis. This includes assigning persistent identifiers (such as DOIs), managing access rights, and ensuring long-term preservation of digital assets. Such services not only improve institutional visibility but also position libraries as central players in scholarly communication infrastructure (Jones, 2018).

Research data analytics and visualization services: With the increasing complexity of research datasets, many academics require support in interpreting and presenting data effectively. Librarians with data analytics skills can provide services such as statistical analysis, visualization dashboards, and interpretation support. This expands the traditional library role into advanced research support and creates new income streams within academic environments.

Data literacy training and capacity-building programmes: This also represent a major infopreneurial avenue. Libraries can organize paid workshops, short courses, and certification programs on RDM, FAIR data principles, data ethics, and open science practices. These programs not only build institutional capacity but also generate revenue while enhancing librarians' professional relevance (Tenopir et al., 2012).

Open science compliance and FAIR data consultancy services constitute a growing area of opportunity. As global research increasingly emphasizes transparency, interoperability, and data reuse, institutions require guidance on aligning with FAIR principles. Librarians can offer specialized consultancy services to ensure that datasets are properly structured for discoverability and reuse, thereby enhancing institutional compliance with international standards (Wilkinson et al., 2016).

Benefits of Infopreneurship in Research Data Management (RDM)

Infopreneurship within Research Data Management (RDM) represents a strategic transformation of academic libraries and librarians into knowledge-based service providers who leverage research data as a resource for innovation, consultancy and value creation. In the evolving digital scholarship environment, this development is increasingly important as universities shift towards open science, data-driven research and competitive knowledge economies (Subaveerapandiyan, 2023; Wilkinson et al., 2019).

1. Enhancement of Research Visibility and Impact

One of the major benefits of infopreneurship in RDM is the improvement of research visibility. When librarians provide services such as data curation, metadata enrichment, and repository management, research outputs become more discoverable, citable, and reusable. Properly managed research data increases citation potential and strengthens institutional research profiles. Studies have shown that well-managed and shared datasets contribute significantly to scholarly impact and global research collaboration (Páres & Organisciak, 2020; Wilkinson et al., 2019).

2. Revenue Generation and Financial Sustainability for Libraries

Infopreneurial RDM services create new income streams for university libraries through consultancy, training workshops, data management planning, and repository development services. In resource-constrained environments such as many Nigerian universities, this supports financial sustainability while expanding the relevance of library services. As

libraries increasingly offer specialized RDM services, they transition into semi-commercial knowledge hubs capable of generating internal and external revenue (Adewale & Adesina, 2021).

3. Improved Research Efficiency and Productivity

Infopreneurial engagement in RDM enhances research efficiency by reducing data loss, duplication, and mismanagement. Librarian-led services in data organization, documentation, and preservation ensure that researchers spend less time managing raw data and more time focusing on analysis and interpretation. Proper RDM also improves reproducibility and accelerates the research process, thereby increasing overall academic productivity (Tenopir et al., 2020; Jones, 2019).

4. Strengthening of Data Sharing and Collaboration

RDM-based infopreneurial services promote data sharing and interdisciplinary collaboration. Through institutional repositories and data-sharing platforms, librarians facilitate access to datasets across institutions and borders. This improves collaboration between researchers, enhances knowledge exchange and supports global research integration. Open science initiatives further reinforce this benefit by encouraging transparency and shared knowledge production (European Commission, 2020; Cox & Kennan, 2021).

5. Capacity Building and Professional Development

Infopreneurship in RDM contributes significantly to the professional development of librarians. By engaging in data consultancy, metadata design, analytics, and training services, librarians acquire advanced digital and analytical competencies. This repositioning enhances their relevance in the modern academic environment and supports continuous skill development aligned with global standards in data stewardship (Tammaro et al., 2020).

Challenges of Infopreneurship in Research Data Management (RDM)

Infopreneurship in Research Data Management (RDM) services represent a growing shift in which academic librarians leverage their expertise in data curation, metadata management, repository services, and research support to generate income and create value-added services. However, despite its potential, several structural, technical, institutional, and human-related challenges hinder its effective implementation, particularly in developing countries such as Nigeria.

1. Limited RDM Skills and Competency Gaps

One of the most persistent challenges is the shortage of advanced competencies among librarians in areas such as data analytics, metadata standards, data curation and repository management. Many academic libraries still operate with staff who are more experienced in traditional librarianship than in data-intensive research support. Studies have shown that inadequate professional preparation significantly limits librarians' ability to deliver RDM-based services effectively (Alex-Nmecha & Onifade, 2023; Hussaini et al., 2023). Similarly, global evidence suggests that lack of specialized data skills remains a major barrier to scaling RDM programs in academic libraries (Faniel & Connaway, 2018).

2. Inadequate ICT Infrastructure and Digital Tools

Infopreneurial RDM services depend heavily on reliable technological infrastructure, including institutional repositories, cloud storage systems, high-speed internet, and data

management software. In many Nigerian university libraries, these facilities are either insufficient or poorly maintained. Issues such as unstable internet connectivity, inadequate servers and erratic power supply continue to undermine service delivery (Igbinovia et al., 2023; Hussaini et al., 2023). Without robust infrastructure, librarians cannot effectively package RDM services as sustainable entrepreneurial offerings.

3. Weak Institutional and Policy Frameworks

Another major challenge is the absence or poor implementation of Research Data Management policies within universities. Many institutions lack formal guidelines for data ownership, sharing, preservation, and commercialization of data-related services. This policy gap creates uncertainty around service boundaries and limits librarians' ability to fully engage in infopreneurial activities (Alex-Nmecha & Onifade, 2023). Globally, strong leadership support and institutional policy frameworks have been identified as key determinants of successful RDM programs (Faniel & Connaway, 2018).

4. Low Awareness and Resistance to Change

Many researchers and academic staff are still unaware of the value of RDM services and often rely on informal or individual approaches to managing research data. This low awareness reduces demand for infopreneurial RDM services such as data curation, metadata consulting, and data management planning. Additionally, resistance to change among both librarians and researchers further slows adoption of new service models (Subaveerapandiyan, 2023). In Nigerian, studies confirm that awareness gaps significantly hinder the uptake of RDM and open science practices (Igbinovia et al., 2023).

5. Funding Constraints and Sustainability Issues

Infopreneurial RDM services require continuous investment in infrastructure, training, and software tools. However, many university libraries operate under severe budgetary limitations, making it difficult to sustain innovative services. Insufficient funding for training and digital infrastructure is consistently reported as a major barrier in African academic libraries (Hussaini et al., 2023; Alex-Nmecha & Onifade, 2023). Without financial sustainability, infopreneurial RDM initiatives struggle to scale or generate consistent revenue.

6. Ethical, Legal, and Data Security Concerns

RDM services often involve sensitive research data, including human subject information and institutional datasets. Infopreneurial activities must therefore comply with strict ethical, legal and privacy regulations. However, many libraries lack clear frameworks for handling data licensing, intellectual property rights and data protection compliance. These uncertainties limit the extent to which librarians can confidently commercialize or monetize certain RDM services (Wilkinson et al., 2016; Subaveerapandiyan, 2023).

7. Limited Collaboration and Stakeholder Engagement

Effective infopreneurship in RDM requires strong collaboration between librarians, researchers, ICT units, and institutional leadership. However, weak collaboration remains a significant barrier in many universities. Studies show that poor coordination between researchers and librarians reduces the effectiveness of RDM implementation and limits service innovation (Hussaini et al., 2023; Igbinovia et al., 2023).

Way forward in Strengthening Infopreneurial RDM Services in University Libraries

Strengthening of infopreneurial Research Data Management (RDM) services in university libraries requires deliberate institutional, technological, and professional interventions that reposition librarians as active participants in the knowledge economy. Recent scholarship shows that although RDM services are expanding globally, their success depends heavily on capacity building, infrastructure development, collaboration, and policy integration (Igbinovia et al., 2024; Chiarelli et al., 2022). Infopreneurial RDM services can only thrive when libraries adopt sustainable strategies that align with open science and data-driven research ecosystems.

1. Capacity Building and Continuous Professional Development

A major strategy for strengthening infopreneurial RDM services is continuous training and upskilling of librarians in data-related competencies. Igbinovia et al., (2024) is of the view that many librarians lack advanced skills in data curation, analytics and research data governance, which limits their ability to deliver robust RDM service. Therefore, structured professional development programmes in data management planning, metadata standards, data visualization and repository management are essential.

Recent RDM training models emphasize hands-on learning approaches that include data interviews, practical repository work, and engagement with researchers, which significantly improve librarians' confidence and service delivery capacity (Koos et al., 2019; Read et al., 2019). Strengthening infopreneurship in RDM therefore depends on building a workforce of "data librarians" who are equipped for consultancy, training, and analytics-based services.

2. Development of ICT Infrastructure and Digital Platforms

Effective RDM infopreneurial services require strong technological infrastructure, including institutional repositories, cloud storage systems, data management platforms and interoperability tools. Without reliable ICT systems, libraries cannot effectively store, preserve, or monetize research data services.

Recent studies highlight that technological inadequacy remains a major barrier to RDM implementation in many academic libraries, particularly in developing countries (Igbinovia et al., 2024). Emerging research also emphasizes the importance of interoperability tools and standardized platforms to enhance data accessibility and reuse across institutions (Efeoglu et al., 2024). Therefore, investment in scalable digital infrastructure is a critical enabler of sustainable RDM-based infopreneurship.

3. Institutional Policy Development and Governance Frameworks

Another key strategy is the establishment of clear institutional policies for RDM. Policies provide a framework for standardizing data collection, documentation, sharing, preservation practices, thereby creating a structured environment for service delivery and entrepreneurship.

According to Chiarelli et al. (2022), effective RDM service development requires a strategic roadmap that aligns institutional priorities, funding structures, and stakeholder roles. Policies should also define intellectual property rights, data ownership, licensing and ethical guidelines, all of which are essential for monetizing RDM services while ensuring compliance with legal and ethical standards.

4. Collaboration and Strategic Partnerships

Collaboration is a central strategy for scaling infopreneurial RDM services. Libraries cannot independently provide all aspects of RDM; therefore, partnerships with ICT departments, research offices, funding agencies, and external data organizations are essential.

Evidence from library case studies according to Read et al., (2019) shows that collaboration significantly enhances RDM service delivery, enabling libraries to build shared repositories, training programmes and research support systems (Read et al., 2019). Additionally, global RDM initiatives encourage inter-institutional collaboration to strengthen capacity and reduce duplication of effort in data management services (Bryant et al., 2023). Such partnerships also create opportunities for joint consultancy and shared revenue-generating services.

5. Integration of RDM into Library Education and Service Innovation

Sustaining infopreneurial RDM services requires embedding data management competencies into Library and Information Science (LIS) curricula. This ensures that future librarians are adequately prepared for emerging roles in data stewardship, analytics, and open science support.

Furthermore, libraries must adopt a culture of innovation by developing new service models such as Data Management Plan (DMP) consultancy, metadata design services, research data analytics, and training workshops. These services represent viable infopreneurial ventures that align with global trends in open science and data commercialization (Tenopir et al., 2012; Wilkinson et al., 2016).

Conclusion

Research Data Management (RDM) has become essential amid rising digital research outputs and open science. Nigerian university libraries can transform RDM services such as data curation, metadata work, repository management, training, DMP development, analytics, and FAIR consultancy into viable infopreneurial activities. These services deliver clear benefits: greater research visibility and impact, new income streams for sustainability, improved research efficiency, stronger collaboration and enhanced professional relevance for librarians. However, progress is limited by skill gaps, weak ICT infrastructure, absent policies, low awareness, funding shortages, ethical/legal uncertainties and poor collaboration. Overall, RDM offers a practical route for Nigerian academic libraries to expand infopreneurial practice, support institutional research productivity and secure librarians' strategic role in the data-driven scholarly environment provided the identified barriers are addressed

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