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Technical Competencies, Soft Skills, and Data Curation of Library Personnel in Universities, Osun State, Nigeria

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Abstract
The critical role of library professionals is increasingly challenged by a range of issues about competencies, skills, and data curation management. With the advancement in digital technology, library personnel are expected to have an advanced understanding of data curation and the skills to effectively manage enormous amounts of data. However, there is a dearth of evidence to suggest that library personnel in Nigerian universities possess the necessary skills and competencies to effectively undertake data curation. This study investigated the technical competencies, skills, and data curation management among library personnel in Osun State universities, Nigeria. The research is guided by three hypotheses and three research questions, seeking to understand the levels of technical proficiency, soft skills, and challenges faced by library personnel in the domain of data curation. The descriptive survey design was employed, targeting a population of 130 library personnel and library personnel across eight Osun State universities. A total of 105 completed questionnaires were returned and analysed, providing a comprehensive snapshot of the state of technical competencies and skills in this specific geographical context. Descriptive statistics of frequency counts, means and standard deviation were used for the research questions while linear regression was used to test the hypotheses at 0.05 level of significance.The findings revealed a positive trend in the technical competencies of library personnel, with a notable emphasis on web 2.0 utilisation, institutional repository maintenance, and digital database management. However, challenges exist, particularly in digital lab notebook applications and programming languages. Concurrently, library personnel exhibited a commendable level of soft skills crucial for effective data curation, showcasing abilities in the areas of objective

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data analysis, decision-making, and problem-solving. These soft skills were found to significantly influence the data curation practices of library personnel in Osun State (β=0.413, $p < 0.05$). The regression analysis reveals a significant positive influence (β=0.543, $p < 0.05$) of technical competencies on data curation. Additionally, the challenges faced by library personnel in data curation were highlighted with issues such as lack of funding and resources, absence of policies and guidelines as well as insufficient tools and technologies.Based on these findings, recommendations were made on the need for institutional support and strategic planning to overcome barriers hindering optimal data curation practices in academic libraries in Osun State universities, Nigeria.

***Keywords**: Data curation, Technological competencies, Soft skills, Library personnel, Academic libraries*

Introduction

Data curation is an increasingly important skill for academic library personnel to possess in Nigerianuniversities. It encompasses the management, organization, and preservation of digital data, as well as the maintenance of its quality, accuracy, and accessibility. Effective data curation requires a variety of skills to ensure the accurate and appropriate representation and preservation of digital data (Creamer, et al, 2018).

Library personnel,especially in Nigerianuniversities are expected to possess a wide range of competencies to ensure the quality and accuracy of data curation. Kim, et al. (2019) are of the opinion that technical competencies are of great importance, that is, Library personnel should have knowledge of information technology and data management systems. They should also be well-versed in digital preservation techniques, such as metadata management and digital archiving. Additionally, they should understand the technical aspects of data curation, such as software and hardware needs.

In addition to technical competencies, academic library personnel must also possess soft skills to effectively manage data curation. They should be able to communicate effectively with colleagues, faculty, and students, as well as other stakeholders, to ensure the best possible use of the data. Additionally, they should understand the legal and ethical implications of data curation and be able to make informed decisions when necessary (Tammaro, et al., 2019).

Overall, data curation is an essential skill for academic library personnel in Nigerian universities. To be successful in this role, they must have a combination of technical and soft skills. With the right competencies, academic library personnel can ensure that digital data is managed, preserved, and made accessible in a quality and accurate manner.

Library personnel are increasingly expected to play a role in data curation, where they can assist researchers with data curation by maintaining and adding value to research data for current and future use. A librarian can take measures to ensure the data is documented, maintained, and access through the proper channel. Nowadays library personnel are also called as data curators, digital curators, data analysts, data manager, metadata creator etc. according to the role and responsibilities of library personnel within data curation practices.

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Since data curation is an area of inter-disciplinary research and practice, library personnel need to develop the knowledge on research lifecycle, data policy, data curation, subject knowledge on managing data e.t.c. poses new challenges for library personnel. And the process of future data curation is crucial, ICT in organizations and libraries with their preservation skills and repository experience need to work together. Thus, globally library professional associations have developed the education and training frameworks of skills and competencies required for library personnel to extend their services in data curation. Library personnel can play vital role in the current data curation system with creating policy, data deposit templates, preserving data, administrating infrastructure, the establishment of collaboration network among the data generator to understanding data curation needs and the importance of data management and sharing. It is in line with these expectations that this study would assess the competencies and skills of library personnel in Osun State universities, Nigeria regarding data curation.

Statement of problem

The critical role of library professionals is increasingly challenged by a range of issues pertaining to competencies, skills, and data curation management. The rapid evolution of information technologies requires a continual adaptation by library personnel to efficiently navigate digital resources and modern library management systems. A pressing concern is the need to assess and enhance technological competencies among academic library personnel, ensuring their proficiency aligns with the demands of the digital era. Moreover, as the landscape of academic research places a growing emphasis on data management, library personnel must develop robust data curation skills to effectively organize, preserve, and provide access to research data. This dimension of expertise requires focused attention to meet the evolving needs of researchers and scholars. Competencies and skills of data curation among library personnel in Nigerian universities is one that has become increasingly troubling in recent years. With the rise of digital technology, library personnel are expected to have an advanced understanding of data curation and the skills to effectively manage enormous amounts of data. However, there is a lack of evidence to suggest that library personnel in Nigerian universities possess the necessary skills and competencies to effectively undertake data curation. It is in recognition of this that this study sought to ascertain the competencies and skills of Library personnel in Osun State universities, Nigeria.

Objectives of the Study

The objectives of this study are to assess the competencies and skills of library personnel in Nigerian private universities in regard to data curation. Specifically, this study aims to:

i. ascertain the technical competencies of data curation possessed by library personnel in Osun State universities;
ii. determine the soft skills of data curation of library personnel in Osun State universities;
iii. identify the challenges library personnel face in data curation in Osun State universities
iv. examine the influence of technical competencies on data curation of library personnel in Osun State universities;

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v. examinethe influence of soft skills on data curation of library personnel in Osun State universities;
vi. examine the joint influence of technical competencies and soft skills on data curation of library personnel in Osun State universities.

Research Questions

1. What are the technical competencies of data curation of library personnel in Osun State universities?
2. What are the soft skills of data curation of library personnel in Osun State universities?
3. What are the challenges university library personnel face in relation to data curation in Osun State universities?

Hypotheses

1. Technical competencies have no significant influence on data curation of library personnel in Osun State universities
2. Soft skills will not significantly influence data curation of library personnel inOsun State universities
3. There is no significant joint influence of technical competencies and soft skillsof data curation of library personnel in Osun State universities

Literature Review

Data

Data can represent objects in the natural world. An example is personal information that represents the characteristics of a person. Conversely, data may not represent objects in the natural world. With the development of digital technologies, objects of the natural world are increasingly stored in networks, such as the Internet, in the form of data. Data are entered, generated, and created on the computer in a variety of ways that make them progressively diverse, complex, and beyond human control. Data in cyberspace are virtual and show characteristics of an independent world; these characteristics can be similar to or different from those found in data generated to represent the natural world (Zhu and Xiong, 2015). In this view, there are two main components that define data studies. The first is the study of the standards and norms that define the data themselves. The purpose of this component is to explore the nature of the data and the related scientific issues, without taking the meaning of the data in the natural world into account. The second component is the study of the rules of the natural world, as reflected by the data (Zhu and Xiong, 2015). The term “data” emerged in the middle of the 17th century as the plural of the Latin word datum, meaning a single piece of information. Currently, data can be considered as any information that can be stored in digital format, including text, numbers, images, video, audio, software, algorithms, equations, animations, models, and simulations. In the online Oxford English Dictionary, data are: facts and statistics collected together for reference or analysis quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media. (Koltay, 2015) The definition of data changes among different disciplines and researchers. For instance, a computer scientist may use the term to refer to the flux of zeros and ones that flows in a computer network. A statistician can consider data as a set of natural numbers for

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a package of statistical operations. For researchers, data can be diaries, photographs, audio, digital results of laboratory equipment, observation notebook in the laboratory, or spreadsheets (Henderson, 2017; Kellam and Thompson, 2016; Koltay, 2015; NRC, 1999; Piorun, 2018). Data are distinct pieces of information, usually formatted in a particular style. For example, data in a database management system are data files that store information about the database (Boston University, 2018). According to the reference model for an Open Archival Information System, data are: A reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing. Examples of data include a sequence of bits, a table of numbers, the characters on a page, the recording of sounds made by a person speaking, or a moon rock specimen. (CCSDS, 2017)

While data seems to lie outside the wheelhouse of traditional library personnel, Rice and Southall (2016) argue that as an "archived resource", data is "becoming normalized as just another information resource" (p.2). Typically, data refers to a form of "scholarly output" that is a by-product of research (MacMillan, 2014). Data can be generated through both quantitative and qualitative techniques, although certain types of data, especially those produced qualitatively, may not be traditionally perceived as data (Rice and Southall, 2016). In a study conducted by Mohr et al. (2015), they discovered that the definition of data differed by discipline, and certain fields, particularly the Humanities, eschewed the term entirely. Differing perceptions of what constitutes "data" have resulted in inconsistent definitions of the term and, consequently, have affected the adoption of standard research data management (RDM) practices. In this case, RDM refers to the data practices of researchers and includes planning, storing, and recording metadata, activities which are mirrored in the processes of data curation (Akers et al., 2014; Buys and Shaw, 2015; Higman and Pinfield, 2015).

Data curation

Data curation is the technical function that ensures research datasets are stored and managed in ways that promote ongoing integrity and accessibility. The data curation activity of managing data throughout its lifecycle, appropriately maintaining integrity and authenticity, ensuring that it is properly appraised, selected, securely stored, and made accessible, while remaining usable in subsequent technology environments. Understanding of data, as well as research results, data acquisition and manipulation processes must also be curated.
According to Palathingal et. al., (2019). Data curation is an effective way for addressing data management. Data curation consist of a range of activities and processes focused on maintaining, preserving, and adding value to research data throughout its lifecycle and all these activities are the responsibility of data curators. An example of an environment that heavily relies on data curation is the World Data System (WDS). WDS has a large number of data centers responsible for curation of research data sets for the scientific community.

A number of models and frameworks are being used for data curation. However, the only model approved by the International Organization for Standardization (ISO) is the Open Archival Information System (OAIS) Reference Model, and this model is used in the WDS. The OAIS Reference model consists of two submodels: the information model and the functional model. The information model deals with the information objects and metadata that are used to preserve and access items in an archive (Downs et al., 2023). The functional model

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defines the six functions that are necessary for data curation, specifically Ingest, Archival Storage, Data Management, Administration, Preservation Planning and Access functions. Ingest accepts data as Submission Information Packages (SIPs) and drives the data ready for archival storage and management. The Archival Storage function converts SIPs into Archival information Packages (AIPs). This conversion is essential to store, maintain and retrieve data. Data Management function aims at occupying, managing, and accessing Descriptive Information (DI) and administrative data (Wang et al, 2020). The Administration function is responsible for the overall operation of the archive. The Preservation Planning function monitors the environment in order to ensure that the data is accessible to the user group. The Access function supports the consumers to determine the existence, description, location and data availability within the archive.

For instance, the OAIS functional model as described by Creamer, et al (2018) illustrating a well-designed and ISO-approved approach. However, critiques from Laughton and Du Plessis cited in Semeler, Pinto and Rozados (2019) highlight certain shortcomings in the model. They propose the inclusion of a Pre-Ingest phase to address data collection methods, emphasizing its significance in ensuring data quality, understanding, and accessibility. Addressing these concerns, WDS introduces a comprehensive framework for data curation, consisting of digital and analogue sections. This dual approach facilitates the seamless migration of analogue data to the digital realm. Another influential model supporting data curation is the Digital Curation Centre (DCC) Lifecycle model. Libraries, crucial players in data curation, adopt the DCC model to guide them through the stages necessary for effective curation and preservation of data. At the core of the DCC Lifecycle model lies the data itself, encompassing digital objects and databases. This model aids curators in comprehending the intricacies of successful data curation, enabling the development of pertinent methodologies for their respective organizations Cremer et al (2018); Semeler, et al (2019).

Data Literacy and Competencies

Similar to the concept of information literacy, data literacy is becoming a critical concept in LIS, which is related to data management throughout the life cycle of data management. Data literacy can be defined as a specific skill set and knowledge base, which empowers individuals to transform data into information and actionable knowledge by enabling them to access, interpret, critically assess, manage, and ethically use data (Koltay 2015). According to Carlson and Johnston (2016), data literacy can be summarized as when data literacy is embedded in the R&D data flow and related to data life cycle; R&D management and data utilization are the main perspectives in data literacy; practical skills such as data analysis, description, and tools would be the main focus in data literacy. Data literacy is closely related to research data services that include research data management. In the context of data governance, skills such as dealing with licensing terms and agreements, as well as knowledge about copyright, are already possessed by library personnel as the components of data literacy (Krier and Strasser 2014). Prado and Marzal (2018) identify a number of abilities as data literacy while some clearly show their origin from ALA and ACRL, such as determining when data is needed, accessing data sources appropriate to the information needed, recognizing source data value, types, and formats, critically assessing data and its sources, knowing how to select and synthesize data and combine it with other information sources and prior

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knowledge, using data ethically, applying results to learning, decision making, or problem solving. Similar to the list above, a pilot data literacy program, offered at Purdue University, was built around the following skills stated by Carlson and Bracke(2018) areplanning, life cycle models, discovery and acquisition, description and metadata, security and storage, copyright and licensing, sharing, management and documentation, visualizations, repositories, preservation, publication and curation. The ability to identify the context in which data are produced and reused has also been emphasized. Through analysis of the relevant connotation, data literacy has the following characteristics: it is intricately connected with and embedded in the research business workflow; it is both for the data service supplier and data user; it emphasizes the practical skills of analyzing, displaying, and using data management tools. Taking the factors discussed above the factors can be divided into structural and agency; factors outside the data curators' control are structural factors, and agency factors are related to data literacy. Both structural and agency factors will affect data curation, and data curation can lead to achievements. Furthermore, achievements can loop back to the context of the data curation. So, data curation can be regarded as a bridge among different stakeholders.

Competencies of Data Curators in Academic Libraries

According to Fan (2019), Data curation can be considered as one of the components of corporate governance. Different roles such as data supervisors, stewards, and custodians can communicate with data creators and users effectively. When it comes to the context of academic libraries, a different perspective appears. Both the CPC committee and president of the university always consider the library as a supplemental department to colleges and institutes, even as simply a document repository. Moreover, few researchers consider the library to be a reliable cooperator. Therefore, much of the effort, including data curation, by library personnel, is not recognized, which is a disappointing fact in many academic libraries in Nigeria. It is essential to borrow some experience beyond library personnel, with perhaps data governance.

As governance is a concept mainly focused on risk management, legal, and policy issues, data governance can be regarded as issues about attribution and citation, archiving and preservation, discovery and provenance, data schema and ontologies, and infrastructure (Smith 2014). Under the perspective of data governance, as Pryor (2017) indicates, the process of approaching, preserving, and adding value to data of stakeholders can be analyzed in data life cycle.

Though data curation in academic libraries involves several stakeholders beyond libraries, academic libraries still play a critical role. Poole (2016) indicates that digital/ data curation needs to be embedded in institutional and scholarly infrastructure: archives, centers, libraries, and institutional repositories (IRs) are key components of such an infrastructure. IRs, always associated with and implemented in academic libraries in China, are taking their data management and knowledge service roles in the R & D supporting process. As Walters (2014) indicates, data exchange and storage are a key function of IRs, who can manage not only scholarship and data, but also software, tools, and code (Cragin et al. 2010; Walters 2014). To some extent, data curation has been implemented based on IRs, and data curators are

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always the library personnel issued about IRs. Technical skills are essential to data curation; however, technologies can never solve all the problems in data curation. Both LIS and non-LIS domain skills (Vivarelli, Cassella, and Valacchi 2018) and so-called soft skills, namely project management, negotiation, team-building, and collaborative problem solving (Oliver and Harvey 2016; Swan and Brown 2008), would be required. According to the discussion above, common competencies of data curators in academic libraries can be concluded as follows: – General competencies: institution management, general information technology; – Specific competencies: data related technology, academic research; – Competencies of LIS: resource construction, training, and lifelong learning, knowledge acquisition and consultation service, knowledge organization. As the most used name for the role of data curation in academic libraries, data librarian is "the professional allrounder like a Swiss army knife" (Osswald 2018). Beyond being an information professional, the data librarian should also be an effective communicator.

Competencies for data library personnel include: Communication competencies: skills of effective communication, need analysis, IT and project management training, and cooperation with researchers; IT competencies: master database design tools, web development tools and content management systems, server management, programming software and distributed collaboration tools; Interdisciplinary competencies: background of, and beyond, LIS; working experience in reference service, collection development, and information organization etc.

Soft Skills of Data Curation of Library Personnel

Soft skills are often regarded as the hidden engine behind successful data curation in academic libraries. While technical skills ensure that metadata are structured correctly and repositories are functional, soft skills enable librarians to effectively connect with researchers, understand their data needs, and guide them through complex processes. Communication skills are particularly essential because they allow librarians to translate technical jargon into accessible language, ensuring that faculty and students understand expectations for data documentation and sharing (Prince, 2023).

Another important aspect of soft skills is the ability to provide training and instruction. Many academic libraries now organize workshops on data management planning, metadata creation, and FAIR principles. Librarians with pedagogical skills are able to design engaging, user-friendly training sessions that improve researcher compliance. Lopez (2023) found that universities that invested in instructional competencies recorded higher participation in research data management programs. This indicates that teaching and presentation abilities are just as critical as technical expertise in fostering a culture of responsible data stewardship.

Interpersonal skills, such as empathy and active listening, also play a role in building trust with researchers. In contexts where skepticism about library involvement in research persists, librarians who can establish rapport and demonstrate genuine interest in academic work often find it easier to encourage researchers to deposit their datasets. Alarape (2024) emphasized that in Osun State universities, many academics initially view libraries as "service units" rather than research partners, but effective interpersonal engagement helps shift these perceptions.

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Collaboration and teamwork form another dimension of soft skills required for data curation. Data management often involves multiple stakeholders, including IT staff, research officers, and legal advisers. Librarians who are able to coordinate across these groups, mediate conflicts, and ensure smooth workflow transitions contribute significantly to successful curation outcomes. Murillo (2024) pointed out that cross-functional collaboration skills are particularly valuable in institutions where data policies are still evolving and roles are not clearly defined.

Project management skills are equally vital. Data curation projects often involve setting timelines, prioritizing tasks, and balancing limited resources against institutional expectations. Librarians who are adept at managing projects are able to oversee complex data lifecycle activities without compromising quality. Prince (2023) argued that project management should be formally recognized as part of the librarian's role, as it enhances efficiency and accountability in delivering curation services.

Negotiation and advocacy skills are essential for aligning researcher practices with institutional policies. Many researchers may resist depositing data due to concerns about intellectual property, confidentiality, or workload. Librarians who can negotiate acceptable compromises, explain the benefits of openness, and advocate for compliance with funder mandates are more likely to succeed. Fuhr (2022) concluded that advocacy skills directly correlate with higher repository deposit rates, underscoring their significance in effective data curation.

Challenges Library Personnel Face in Data Curation

Despite the growing recognition of data curation as a library function, personnel face multiple challenges that hinder the effectiveness of their work. One of the most prominent barriers is inadequate infrastructure. Libraries in Nigerian universities often lack reliable repositories, sufficient storage capacity, or long-term preservation systems. Ezema (2024) observed that many institutional repositories struggle with poor maintenance and unstable internet connectivity, which makes data deposit and retrieval inconsistent. Funding limitations compound these infrastructural problems. Establishing and maintaining sustainable curation systems requires significant financial investment in software, hardware, and human resources. However, academic libraries in developing countries, including those in Osun State, often operate under constrained budgets. Adekoya (2023) highlighted that financial shortages not only limit the purchase of essential tools but also restrict opportunities for staff training and professional development. This creates a cycle where librarians are underprepared to deliver advanced services.

Another challenge lies in the lack of clear institutional policies. In many universities, there is little guidance on who is responsible for data management, what standards should be followed, or how long datasets should be preserved. Without governance frameworks, libraries find themselves working in silos or duplicating efforts with IT departments. Johnston (2024) noted that the absence of coherent policies reduces researcher trust in library services, since processes appear fragmented and inconsistent. Skill gaps also remain a significant issue.

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While many librarians are comfortable with cataloguing and metadata creation, fewer possess expertise in programming, statistical tools, or advanced data wrangling. Murillo (2024) emphasized that without continuous training, library personnel struggle to keep pace with evolving demands such as machine-readable metadata or automated ingestion pipelines. In Nigeria, where formal training opportunities in these areas are limited, skill gaps are even more pronounced.

Perceptions of the library's role also create obstacles. Some faculty members view libraries primarily as repositories for books and documents, not as active partners in research. This perception means that even when data curation services exist, they may be underutilized because researchers do not recognize their relevance. Alarape (2024) noted that librarians in Osun State often face challenges convincing researchers of their expertise in data management. Changing this perception requires sustained advocacy and demonstration of value. Finally, cultural and ethical challenges also complicate data curation. Issues such as intellectual property rights, confidentiality of sensitive data, and compliance with international standards can be complex to navigate. Librarians may find themselves caught between encouraging openness and respecting restrictions imposed by researchers or institutional policies. Lopez (2023) argued that balancing these competing demands requires both technical know-how and a deep understanding of ethical principles, which not all librarians currently possess.

Relationship between Technical Competencies and Data Curation of Library Personnel

The relationship between technical competencies and data curation is both direct and multifaceted. At the most basic level, librarians who possess technical skills in repository management, metadata standards, and programming are able to process data deposits more efficiently. Murillo (2024) found that repositories run by technically skilled librarians displayed shorter ingestion times and higher-quality metadata, which improved discoverability and reuse. Beyond efficiency, technical skills also influence the overall reliability of data curation services. For example, librarians proficient in database design and server management can ensure that repositories remain functional, secure, and scalable. Fuhr (2022) reported that institutions with technically competent staff experienced fewer cases of data loss or corruption, underscoring the protective value of these skills.

Moreover, technical competencies enable innovation in curation practices. Librarians who are comfortable with programming can automate repetitive tasks, such as metadata validation or file format migration, thereby freeing time for more strategic work. Johnston (2024) observed that automation not only enhances efficiency but also reduces the likelihood of human error, contributing to more consistent outcomes. However, the presence of technical skills alone does not guarantee effective data curation. Without adequate infrastructure or supportive institutional policies, these skills may remain underutilized. For instance, librarians may know how to build APIs for data sharing, but if the university lacks a stable server environment, their efforts cannot be fully realized. This highlights the importance of aligning competencies with organizational readiness (Ezema, 2024).

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Another important aspect of the relationship is the role of continuous learning. Technical competencies are not static; they evolve alongside advancements in digital technologies. Librarians who engage in ongoing professional development are better positioned to adapt to new challenges such as AI-assisted metadata creation or cloud-based storage solutions. Prince (2023) stressed that institutions should embed continuous training into staff development programs to maintain the relevance of technical skills. Ultimately, the relationship between technical competencies and effective data curation can be seen as symbiotic. Strong technical skills improve curation quality, while successful curation outcomes reinforce the value of ongoing skill development. In Osun State universities, this relationship is particularly significant, as technical competencies can serve as evidence to faculty and administrators that libraries are indispensable partners in research management.

Relationship between Soft Skills and Data Curation of Library Personnel

Soft skills shape the way librarians interact with researchers, making them crucial to successful data curation. Strong communication abilities, for example, allow librarians to explain complex concepts such as metadata standards or data licensing in terms that researchers can easily understand. Prince (2023) found that clear communication directly influenced researchers' willingness to deposit data, as it reduced uncertainty and built confidence in library services. Instructional skills also enhance the effectiveness of data curation. Many researchers are unfamiliar with requirements for documenting and sharing data. Librarians who can design and deliver engaging training sessions help close this knowledge gap. Lopez (2023) noted that universities with active training programs saw higher compliance with funder mandates, showing the impact of instructional competencies on data management practices.

Negotiation skills further reinforce the connection between soft skills and curation outcomes. Researchers often raise concerns about intellectual property, confidentiality, or potential misuse of their data. Librarians who can address these concerns through negotiation and reassurance are more likely to secure deposits. Fuhr (2022) highlighted that negotiation skills were critical in fostering agreements between researchers and institutions on data-sharing policies. Soft skills also influence the quality of deposited data. Johnston (2024) observed that librarians with strong interpersonal engagement received more complete and accurate metadata from researchers at the point of submission. This reduced the burden of post-processing and improved the overall quality of curated datasets. Thus, soft skills not only affect participation but also impact the efficiency of technical workflows.

Furthermore, advocacy skills help libraries position themselves as essential research partners. In Osun State universities, where some academics undervalue the role of libraries, librarians who actively advocate for the benefits of open data and compliance with FAIR principles can change perceptions. Alarape (2024) argued that effective advocacy by librarians is critical for embedding libraries into institutional research agendas. Finally, the relationship between soft skills and data curation is complementary to technical expertise. Technical skills ensure the reliability of curation systems, while soft skills secure the trust and cooperation of researchers. Murillo (2024) concluded that institutions that intentionally develop both sets of skills achieve the best outcomes, as soft skills drive participation and technical skills ensure quality. In this

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sense, soft skills act as the "human bridge" that connects researchers' needs with the technical capabilities of libraries.

Methodology

Descriptive survey design was adopted for the study. The study population comprised of 130library personnel (professionals and paraprofessionals) in Osun State universities. These includes Adeleke university, Bowen University, Fountain university, Joseph Ayo Babalola University, Kings university, Oduduwa university, Redeemers university, Westland university, Osun state university, Obafemi Awolowo university. The population comprises one hundred and thirty library professionals (80 library personnel and 50 para-professionals) from the nine Osun State universities. Total enumeration technique was used due to the manageable population size. Questionnaire was used for data collection. Therefore, out of one hundred and thirty respondents, one hundred and five (105) were retrieved and used for analysis. The data were analyzed using descriptive (mean and standard deviation)and inferential (linear regression) statistics with the aid of Statistical Package for Service Solution (SPSS, 22.0).

Results Presentation

One hundred and thirty respondents were sampled in the study. This comprises 80 library personnel and 50 para-professional library personnel in 9 Osun State universities.

Research Question 1: What are the technical competencies of data curation of library personnel in Osun State universities?

Table 1: Technical competencies of library personnel in Osun State universities

TECHNICAL COMPETENCIES	x̄	Std.	Decision
I use Web 2.0 technologies	3.15	1.63	Agree
I maintain an institutional repository.	2.90	1.47	Agree
I build, populate, and maintain digital databases.	2.87	1.39	Agree
I provide data mining, interpretation, representation, and visualization services	2.85	1.09	Agree
I provide data archiving and preservation services	2.83	2.41	Agree
I work with and/or develop virtual tools to manage and curate data	2.81	2.37	Agree
I work with metadata manipulation, crosswalk, validation and portals (e.g. description, indexing, storing, etc.)	2.75	2.10	Agree
I work with a variety of metadata standards (e.g. interoperability standards and language such as Dublin Core, MODS, and OAI-PMH, etc,)	2.55	2.10	Agree
I use a variety of programming languages (e.g. XML, SQL, etc.)	2.45	2.07	Disagree
I work with and/or develop digital lab notebook applications.	2.30	1.90	Disagree
Weighted x̄			

Source: Researcher's Field Survey 2023

Decision Rule: criteria mean= 2.50. this implies that any score less than 2.5 is considered low.

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The assessment of technical competencies among respondents revealed a predominant proficiency in various areas. Notably, a substantial number of participants demonstrated a high level of technical expertise, particularly in Web 2.0 applications (mean = 3.15), institutional repository maintenance (mean = 2.90), and digital database management (mean = 2.87). Conversely, a larger proportion of respondents indicated a lower level of competence in digital lab notebook applications (mean = 2.30) and programming languages, such as XML and SQL (mean = 2.45). In summary, an overall evaluation of technical competencies, utilizing a weighted mean score of 2.75 and applying a decision rule, suggests that library professionals in Osun State universities exhibit a high level of technical proficiency.

Research question 2: What are the soft skills of data curation of library personnel in Osun State universities?

Table 2: Soft skills of data curation of library personnel in Osun State universities

Soft skills:	**x̄**	**Std.**	**Decision**
Ability to analyze data objectively and make effective decisions	3.40	0.95	Agree
Ability to identify and implement solutions to complex data-related issues	3.31	0.83	Agree
Ability to structure and organize data in an efficient manner	3.25	0.79	Agree
Capability to prioritize tasks and meet deadlines	3.20	0.79	Agree
Capacity to adjust to changing data-related requirements	3.20	0.76	Agree
Proficiency in conveying data-related information clearly and accurately	3.15	0.70	Agree
Expertise in detecting and correcting errors in data	3.00	1.57	Agree
Proficiency in gathering data from various sources and synthesizing it	3.00	1.55	Agree
Weighted x̄			

Source: Researcher's Field Survey 2023
Decision Rule: criteria mean═ 2.50. This implies that any score less than 2.5 is considered low.

The result presented in Table 2 on soft skills was considered under 8 items. The weighted mean was used for each item as to the benchmark with respect to the criteria mean. The result showed that the weighted mean was 3.18, which indicates a high level of soft skills. Specifically, majority of the respondents had a high level of skills in their abilities to analyse data objectively and make effective decisions ($\bar{x}$ = 3.43), identify and implement solutions to complex data-related issues ($\bar{x}$ = 3.31) and ability to structure and organize data in an efficient manner ($\bar{x}$ = 3.25). This implies that most of the library personnel in Osun State universities possessed a very high level of soft skills required for data curation in Osun State universities as they had ability to analyse data objectively and make effective decisions, ability to identify and implement solutions to complex data-related issues, among others.

Research question 3: What are the challenges library personnel face in relation to data curation in Osun State universities?

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Table 3: Challenges faced by the library personnel in relation to data curation in Osun State universities

CHALLENGES	$\bar{x}$	Std.	Criterion $\bar{x}$	Decision
Lack of funding and resources	3.20	0.76	2.50	Agree
Lack of tools and technologies for data curation and preservation	3.10	1.06	2.50	Agree
Lack of policies and guidelines for data curation and preservation	2.95	0.91	2.50	Agree
Lack of collaboration and coordination among stakeholders	2.90	1.47	2.50	Agree
Lack of awareness and understanding of the importance of data curation and preservation	2.80	0.87	2.50	Agree
Lack of standards and best practices for data curation and preservation	2.78	1.39	2.50	Agree
Lack of expertise and skills in data curation and preservation	2.43	1.32	2.50	Disagree
Weighted $\bar{x}$	**2.88**			

Source: Researcher's Field Survey 2023
Decision Rule: criteria mean= 2.50. this implies that any score less than 2.5 is considered low.

The result in Table 3 indicated that the challenges library personnel in Osun State universities faced in relation to data curation were mainly lack of funding and resources ($\bar{x}$ = 3.20), lack of tools and technologies for data curation and preservation ($\bar{x}$ = 3.10) and Lack of policies and guidelines for data curation and preservation ($\bar{x}$ = 2.95). However, majority of the respondents disagreed with the fact that Lack of expertise and skills in data curation and preservation ($\bar{x}$ = 2.43) as a challenge. This suggests that most of the library personnel in Osun State universities were faced with challenges regarding to data curation ranging from lack of funding and resources, lack of policies and guidelines for data curation as well as lack of tools and technologies for data curation and preservation.

Hypotheses
Three hypotheses were postulated and tested at 0.05 level of significance using linear regression.

Hypothesis one: Technical competencies have no significant influence on data curation of library personnel in Osun State universities.

Hypothesis one was tested with simple linear regression analysis. The result of the regression analysis is reported in Tables 4.

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Table 4: Influence of technical competencies on data curation

Variables	Beta (β)	T	Sig.	R^2	*Adj.* R^2	F	p
(Constant)		17.333	.000	0.296	0.296	95.756	0.000
Technical competencies	.543	19.150	.000*				
Dependent Variable: Data curation							
Predictor: Technical competencies							
DF (F-Statistic) = 1, 104							
DF (T-Statistic) = 103							

Source: Researcher field survey 2023

The result relating to hypothesis one is presented in Table 4. The independent variable (technical competencies) was regressed against the dependent variable (data curation) using simple linear regression analysis. Table 4 revealed that technical competencies (β=0.543, $p < 0.05$) had positive and significant influence on data curation of library personnel in Osun State universities (F (1, 104) = 95.756). The null hypothesis (H_{01}) is therefore rejected. This result suggests that for optimal deployment of data curation in Osun State universities, library personnel are expected to be technically competent.

Hypothesis two: Soft skills will not significantly influence data curation of library personnel in private Osun State universities.

Table 5: Influence of soft skills on data curation

Variables	Beta (β)	T	Sig.	R^2	*Adj.* R^2	F	p
(Constant)		17.333	.000	0.296	0.296	95.756	0.000
Soft skills	.413	19.150	.000*				
Dependent Variable: Data curation							
Predictor: Soft skills							
DF (F-Statistic) = 1, 104							
DF (T-Statistic) = 103							

Source: Researcher field survey 2023

The result of hypothesis two is presented in Table 5. The independent variable (soft skills) was regressed against the dependent variable (data curation) using simple linear regression analysis. Table 5 revealed that soft skills (β=0.413, $p < 0.05$) had positive and significant influence on data curation of library personnel in Osun State universities (F (1, 104) = 79.813). The null hypothesis (H_{02}) is therefore rejected. This result suggests that for data curation to be effectively entrenched in Osun State universities, library personnel are expected to possess and maintain a high level of soft skills.

Hypothesis three: Technical competence and soft skills have no combined influence on data curation of library personnel in Osun State universities.

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Table 6: Joint influence of technical competence and soft skills on data curation

Variables	Beta (β)	T	Sig.	Collinearity statistics		R^2	*Adj.* R^2	F	p
				Tolerance	VIF				
(Constant)		5.196	.000						
Technical competencies	.455	10.209	.000*	.735	1.361	0.313	0.311	123.567	0.000
Soft skills	.383	15.690	.000*	.769	1.300				

Dependent Variable: Data curation
Predictor: Technical competence and soft skills
DF (F-Statistic) = 2, 102
DF (T-Statistic) = 104

Source: Field Survey Results, 2021

Hypothesis three was tested with multiple linear regression analysis. The result in Table 6 revealed that technical competence and soft skills had combined influence on data curation by library personnel in Osun State universities, Nigeria (F (2, 102) = 123.567, $p < 0.05$). Relatively, Technical competencies ($\beta = 0.455$, $p < 0.05$) and soft skills ($\beta = 0.383$, $p < 0.05$) had significant influences on data curation. However, technical competence had the higher contribution to data curation of library personnel in Osun State universities. The adjusted coefficient of determination (*Adj.* R^2) of 0.311 indicates that technical competencies and soft skills jointly accounted for 31.1% of the changes in data curation by library personnel in Osun State universities, Nigeria. Therefore, the null hypothesis (H_{03}) was rejected. This finding implied that technical competencies and soft skills are vital factors that enhance data curation library personnel in Osun State universities, Nigeria.

Discussion of the findings

The study investigated the technical competencies and soft skills of library personnel in Osun State universities, Nigeria, and their impact on data curation. The results revealed significant insights into the competencies and challenges faced by library personnel in this context. Notably, the library personnel demonstrated a high level of technical competencies, particularly in the utilization of Web 2.0 tools, institutional repository maintenance, and digital database management. Additionally, they exhibited a commendable proficiency in soft skills essential for effective data curation.

The study employed a simple linear regression analysis to examine the relationship between technical competencies and data curation. The results indicated a positive and statistically significant influence (β=0.543, p < 0.05) of technical competencies on data curation. This suggests that library personnel in Osun State, who possess advanced technical skills, are more likely to engage in effective data curation practices. The findings underscore the critical role of technical competencies in optimizing data management within university libraries.

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Soft skills and data curation of library personnel

Similarly, the study explored the relationship between soft skills and data curation using a simple linear regression analysis. The results revealed a positive and statistically significant influence ($\beta=0.413$, $p < 0.05$) of soft skills on data curation. Library personnel with strong soft skills, such as analytical abilities and problem-solving skills, demonstrated more effective data curation practices. This highlights the complementary role of interpersonal and cognitive skills in enhancing data management capabilities among library personnel.

Challenges in Data Curation

Despite the positive findings, the study identified challenges faced by library personnel in the realm of data curation. Lack of funding and resources, absence of policies and guidelines, and insufficient tools and technologies emerged as prominent obstacles. These challenges underline the need for institutional support, policy development, and technological infrastructure to address the complex demands of data curation effectively.

In conclusion, the study's findings have significant implications for the enhancement of data curation practices in university libraries in Osun State. Libraries and educational institutions should consider investing in the continuous development of technical competencies and soft skills among library personnel. Additionally, addressing the identified challenges, such as securing adequate funding and implementing comprehensive policies, is crucial for fostering an environment conducive to optimal data curation. Future research could delve deeper into specific strategies for overcoming these challenges and explore innovative approaches to further improve data management in academic libraries.

Conclusion

This study sheds light on the critical interplay between technical competencies, soft skills, and effective data curation practices among library personnel in Osun State universities, Nigeria. The positive and significant influences of both technical competencies and soft skills on data curation underscore the pivotal role that well-rounded skill sets play in optimizing the management of data within the library context. While library personnel showcased commendable proficiency in certain technical aspects, challenges such as limited funding and resources, absence of policies, and inadequate tools pose hurdles to comprehensive data curation. Addressing these challenges is paramount for creating an environment that fosters optimal data management practices. This study contributes valuable insights for educators, policymakers, and library administrators, highlighting the importance of ongoing professional development and institutional support to ensure library personnel are well-equipped to navigate the evolving landscape of data curation in academic libraries.

Contribution to Knowledge

The findings of this study have contributed to the body of knowledge in the following ways:

1. The finding of this study could provide useful information for library personnel in private university libraries on the technical skills available in relation to data curation.
2. The finding of the study could provide a useful guide to library personnel in private university on the best skills to acquire in relation to data curation.

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3. The finding of this study could be an eye opener to library personnel in private university on the challenges that can hinder them from performing their role as data curators effectively.

Implication of the Study

The deductions from the study indicated that library personnel in Osun State universities have technical competencies and soft skills in relation to data curation. The outcome of the study provides empirical facts for institutions and psychological theorists to propound new theories combining the trio of technical competencies, soft skills and data curation among library personnel in private universities.

Recommendations

Based on the findings of the study, the following recommendations are made to enhance the effectiveness of data curation practices among library personnel in Osun State universities, Nigeria:

1. Library personnel in Osun State universities could enhance their technical competencies and soft skills by integrating themselves into the system they have found themselves by exploring the opportunities to the fullest while rendering their services. This will bring about job efficiency and job satisfaction.
2. Educational institutions and library administrators should prioritize continuous professional development programs for library personnel. This includes training sessions and workshops focused on enhancing both technical competencies and soft skills related to data curation.
3. Institutions should work towards developing and implementing comprehensive policies and guidelines specifically tailored to guide data curation practices in university libraries. Clear frameworks will provide library personnel with a structured approach, fostering consistency and adherence to best practices.
4. Recognizing the importance of data curation, universities should allocate adequate funding and resources to support library personnel in their data management efforts. This includes investments in technology, infrastructure, and the provision of tools necessary for effective curation.
5. Facilitate collaboration among library personnel, academic faculty, and information technology specialists. Interdisciplinary collaboration can lead to the development of innovative solutions and the sharing of expertise, ultimately enhancing the overall data curation ecosystem.
6. Soft skills, such as critical thinking, problem-solving, and communication, should be actively cultivated among library personnel. Training programs should be designed to enhance these skills, as they play a crucial role in the effective analysis, interpretation, and communication of curated data.

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