Evidence Based Journal of Information Science
Volume 1, Issue 2, December, 2025
ISSN: 1595-6148
https://journals.kasu.edu.ng/index.php/lib

LIBRARIANS' OPEN SCIENCE KNOWLEDGE AND DATA ANALYSIS SKILLS IN THE ERA OF ARTIFICIAL INTELLIGENCE: EVIDENCE FROM A MULTI-INSTITUTIONAL SURVEY

Ibikunle Gladys[1], Allamagani, Khali[2]
[1] Medical Library College of Medicine University of Lagos,
[s] Kaduna State University, khali.allahmagani@kasu.edu.ng

Abstract

The skills of librarians in open science ensures accessibility of information resources without barriers based on the findable, accessible, interoperable and reuseable (FAIR) principles, while leveraging on artificial intelligence for data analytic skill boosts the confidence of librarians' research in using digital tools to provide insight to research outcomes and proffer diverse solutions. However, the need to ascertain the AI readiness and data analytic skills of Librarians across diverse libraries in embracing the transformation in library services is essential. The study used descriptive research methods to determine the level of librarian's awareness of open science, AI readiness, data Science skills, research participation and level of institutional support available librarian across different institutions in Nigeria. A purposive sampling was adopted to obtain responses from 47 librarians with the aid of an online google form. A reliability test was conducted using the Cronbach Alpha and a consistency of 0.955 was obtained, indicating a high reliable instrument for the study. The result of the descriptive studies indicated that AI readiness had the highest mean score (M = 3.10, SD = 1.30), followed by data science skills (M = 3.02, SD = 1.21) and institutional support (M = 2.96, SD = 1.55). Open science awareness (M = 2.86, SD = 1.36) and collaborative research participation (M = 2.85, SD = 1.20) recorded the least mean scores. The study concludes that librarians employed in Nigeria are willing and ready to Adopt AI but may be limited from the moderate levels revealed in the study. The study therefore recommends that the management of library institutions should be proactive in supporting librarians to adopt artificial intelligence through training and policy implementation.

Keywords: *Open science, Data analysis skills, AI readiness, Institutional support*

Introduction

Rapid advancement of digital technologies has impacted AI and data science prompting a shift in information services and service delivery, due to this context and relevancy librarians are required to develop competencies in open science practices, AI and data analytics. In Nigeria, there is a great need for librarians to possess diverse skills, such as the data management, digital literacy and

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

ability to leverage on emerging technologies. Despite this awareness there is paucity of empirical evidences on the extent of librarians open science knowledge, AI readiness and data analytic skills in the context of Nigeria. Due to these knowledge gap, the necessity of assessing the preparedness of librarians on the adoption and implementation of strategies to library service enhancement and support research collaboration.

Therefore, this study aims to investigate the level of librarians' open science knowledge, AI readiness, data skills and research collaboration with a focus on identifying existing skills gaps and exploring whether exposure to AI can help bridge the gaps. The study is limited to librarians in academic, public, special and research libraries in Nigeria. Respondents were majorly librarians who had degrees in library and information science.

Objective of the Study: To examine the level of librarian's open science knowledge, AI readiness, data skills and research collaboration.

Research Question

1. What is the level of awareness of librarians on open science?
2. What is the level between librarians AI readiness?
3. What is the level of data science skills among librarians?
4. What is the level of research participation among librarians?
5. What is the level of institutional support?

Review of Literature

Open science movement has breakdown barriers to scholarly content publishing by bridging knowledge gaps. According to IFLA open science, it is defined as an inclusive framework that brings together various methods and practices to make multilingual scientific knowledge openly available, accessible and reuseable to everyone (UNESCO, 2021). Research becomes transparent

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

and inclusive, making scientific findings available to amateurs and professionals publicly (Klebel etal., 2025). Open science refers to making scholarly content accessible and transparent and the elements that promote accessibility, transparency and collaboration in research including open access, open data and open educational resources. It also involves advocating for open research processes, open access and broader dissemination of scientific knowledge to the public (Havemann, 2023 cited in (Onyebinama et al., 2024). They appear in different publishing formats such as reports and preprints(Bertram et al., 2023). Open Science has also led to the democratization of knowledge and the implementation of academic freedom, open educational and research activities (Mielkov, 2023). Librarians' roles as facilitators, managers of open access resources and intermediaries tb the scholarly communications process. Libraries and librarians now actively advocate open access initiatives to promote unrestricted sharing of research outputs and publications, for open access implementation, strong institutional and library management support is required in data management, development of metadata, data standards, research support services, provision of data repositories and proper storage of data within the institutional repository (Adetayo, 2023). To ensure efficient access librarians increasingly leverage open access and open science. Scholars like (Nabi, 2024) noted that librarians curate and promote research support service and academic resources including databases, journals, digital documents and metadata standards to enhance discoverability of research output. Academic libraries in Nigeria now offer academic publication services and deposit of intellectual contents into the institutional repositories.

AI in Libraries and Readiness of Librarians

Libraries globally are integrating machine learning, natural processing language and robotics to automate library processes, enhance digital archiving and improve user services (Isiaka, 2023). AI

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

offers libraries the opportunity to streamline repetitive tasks and provided personalized services especially as users are increasingly digital literate yet still require librarian's support to maximize these technologies (Tekale, 2025). Librarians have leverage AI to improve and enhance service delivery across various functions. Notably. AI have been deployed into the technical aspect of librarianship which include cataloguing, classification and metadata generation.

AI has introduced both opportunities and challenges as documented in literature (Duan et al., 2019). According to Jan et al (2024) readiness for innovative technologies involves not only individual willingness to adapt AI but also institutional support such as the willingness of individual to adopt AI and Institutional support such as providing technological expertise, financial resources, policy framework and data management skills. Studies show that librarians are increasingly familiar with and have integrated AI tools into library services. (Fagbola & Egbebi, 2025) found that librarians are aware of AI tools and harnessing them to improve efficiency to foster innovative library services. However, librarians' knowledge and adoption of AI remain a significant concern mainly due to infrastructure limitations, funding constraints and limited technology capabilities (Fida et al., 2025)**.** Librarian's proficiency in Open science enhances access to information resources without barriers following the findable, accessible, interoperable and reusable (FAIR) principles. Additionally, data analytics skills in the era of artificial intelligence empowers librarians to support research and confidently use digital tools to provide effective solutions. It becomes essential to assess the AI of librarians.

Data Science Skills Required for Modern Librarianship

Librarianship has shifted from the traditional method of performing task to a more data driven profession. Data science has become an essential competency for modern libraries, empowering librarians to extract meaningful insights from data and deliver impactful library services. Training

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

and development in open science are crucial because they form the foundation for implementing open science practices which are closely linked to research integrity (Carroll et al., 2017). Data science competencies for librarians include skills in statistics, system analysis, programming, data visualization and machine learning, (Achra, 2023).

Librarians have the mandate to support research for faculty and staff and this requires well-built data science skills to transform raw data into meaningful insights. Data analytics involves gathering raw data, processes it, identifying patterns and applying statistical and computational models to derive actionable insights. Artificial intelligence has significantly enhanced the speed, accuracy and usability of data analytics by reducing human labor and enabling real time processing (Mishra et al., 2025). AI data-driven analytics streamlines decision making, improves predictive modeling and automates data. Data science skills are therefore essential for librarians; especially because of the wide range of tools they must be competent in. Common data analytic tools include Microsoft excel, Tableau, Google analytics, Power Bi and programming languages such as Python. According to (Chui et al., 2018) Machine language and Natura Language Processing provide real time analytics, anomaly detection and smart data visualization. These underscores implies that librarians need to be proficient in data visualization and analytical techniques. Furthermore, data librarians must possess skills in documentation and preservation to ensure that data remains useable and re-usable (Semeler et al., 2019). Despite these needs an evident skills gap exists among librarians in data analysis competencies.(Luo & Tang, 2024) identified a critical mismatch between the data skills required in libraries and the current capabilities of librarians. These skills are essential for research data management, data curation, analysis and fostering digital literacy in an increasingly data-rich environment. Consequently, there is a need to assess AI readiness of librarians across diverse libraries.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Empirical Studies on Librarians Readiness for AI, Open Science and Data Science Skills

(Ahmed & Othman, 2021)reported a partial adoption of Open Science practice among librarians and researchers in Malaysian public university using mixed-methods approach. Similarily, (Ogunbeni et al., 2018) in a quantitative study on the roles of academic libraries in propagating open science, found that academic libraries are key player in advocacy, repository development and supporting collaborative research. In another study, (Santos-Hermosa & Boté-Vericad, 2024) examined Spanish academic librarians' perceptions of open science and revealed that both librarians and researchers possess a high level of awareness and knowledge. Their findings further recommended that university should support librarians in training researchers on open science practices. Likewise, (Orubebe et al., 2025) highlighted a similar trend regarding librarians' awareness of AI, noting that such awareness has contributed to increased efficiency in library service delivery. Although they emphasized that continuous capacity building is necessary for successful integration.

Scholars such as Mabawonku and Buraimo (2025) examined the preparedness of librarians for managing AI-generated metadata and found that although librarians demonstrated moderate awareness of AI tools, knowledge of advanced tools such as GPT-4 remained low. Despite this limitation, the study reported a generally positive attitude toward AI adoption. In a related study, Samzugi (2025) investigated the adoption of Open Science among librarians in Tanzania and reported that 81.1% of the respondents were familiar with Open Science practices. The study recommended intensified advocacy and continuous training to maximize open access, enhance data analytics for research publications, and strengthen the principles of citizens' rights to scholarly communication.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Similarly, Obim et al. (2023) explored the impact of Open Science on academic libraries in educational institutions in Rivers State, Nigeria, and found that Open Science significantly promoted collaboration due to unrestricted access to scholarly resources. However, Adekunle et al. (2025) observed that although awareness of AI among librarians was high, the actual application of AI tools in service delivery remained low, largely due to inadequate infrastructure and lack of training gaps from the management of the institution were.

Furthermore, Onyebinama et al. (2024) studied Open Science in African academic libraries and reported challenges such as limited funding, poor infrastructure, and a shortage of skilled professionals. These constraints hinder African researchers' ability to contribute effectively to the global scientific community and engage in international collaboration. With regard to data science competencies, (Ashiq & Warraich, 2023) noted that progress in data librarianship has been slow due to its dynamic and evolving nature. Conversely, (Fuhr, 2022) found that librarians who already provide data services possess relatively high skill levels, though further enhancement is still needed through targeted training initiatives.

Institutions have supported the open science in divers' capacity. According to (Tzanova, 2020) in a study on changes in academic libraries in the era of open science opined that open science is not entirely free, its implementation includes expenses funded through institutional budget, research grants and open access initiatives which constitutes roles institutions take in supporting open science. Nonetheless, literature consistently highlights the vital role librarians play in advancing open science through advocacy, capacity building, research support and effective management of institutional repositories.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Methodology

This study adopted a quantitative research design and employed purposive sampling. Purposive sampling involves the intentional selection of participants based on their relevance to the research objectives (Tajik et al., 2024). Quantitative data were collected using a structured questionnaire administered to librarians through various online platforms using Google Forms. The questionnaire underwent both face and content validation to ensure its accuracy and relevance. Furthermore, a reliability test was conducted using the Cronbach Alpha Method, which yielded a coefficient of 0.955, indicating a highly reliable instrument. A total of forty-seven (47) librarians completed the questionnaire. Consent was sought from the respondent before administering the questionnaire.

Method of Data Analysis

Data collected from the questionnaire were analyzed using Version 23 of the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequency distribution, percentages, mean, and standard deviation were used to answer the research questions. Data were analyzed using descriptive statistics, including mean scores and standard deviations. Responses obtained from the 5 level Likert scale were converted to numerical values to compute descriptive measures. Mean scores were interpreted using predefined decision criteria to classify levels as low, moderate, or high. Ethical principles guiding social science research were strictly observed. Information consent was obtained from all participants and data were used solely for academic purposes.

Table 1: Demographic Variables of Respondents

Variables	No	Percentage (%)
Male	15	31.9
Female	32	68.1

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Age Group		
50 +	17	36.2
40-49	26	55.3
30-39	3	6.4
20-29	1	2.1
Educational Background		
PhD	24	51.1
Masters'	22	48.8
Diploma	1	3.1
Institution		
Academic Libraries	36	76.7
Research Libraries	4	8.5
Special Libraries	4	8.5
Public Libraries	3	6.3
Professional Experience (yr)		
0-5		
6-10	1	2.1
11-15	4	8.5
16-19	24	51.1
20+	9	19.1
	9	19.1
AI Training Received		

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Yes No	30 17	63.8 36.2
Institutional Policy on AI or OS Yes No Not Sure	 19 19 9	 40.1 40.1 19.1

Table 1 revealed that female 32 (68.1%) were more represented than the male 15(31.9%), this implies that both genders participated and were well captured in the study. The young adult formed a larger part of the respondents with 26 (55.3%) with in the age bracket of 40-49. The highest qualified librarians had a Ph.D. 24 (51.1%), implying a qualified and learned librarian. Librarians from academic libraries dominated the population under study with 36 (76.6%) all categories of libraries were also represented minimally. The table further revealed librarians to have good years of work experience, 24 (51.1%) had 11-15 years of work experience. Majority of the librarians indicated that they have never had any training on AI 30 (63.8%), while 38 (80.8%) indicate that they have no institutional policy on AI and Open science.

Table 2— Librarians Awareness of Open Science (RQ1)

Item	Statement	Mean	SD
A1	I am familiar with the principles of Open Science (e.g., transparency, reproducibility, openness).	2.98	1.4063

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

A2	I can explain the FAIR data principles (Findable, Accessible, Interoperable, Reusable).	2.815	1.3018
A3	I am aware of my institution's open access policies or guidelines.	2.660	1.3717
A4	I regularly promote or support open access publishing to researchers.	3.043	1.3825
A5	I can advise on data sharing (e.g., repositories, licenses, metadata).	3.106	1.4178
A6	I have supported researchers to deposit data in a repository in the last 12 months.	2.745	1.3747
A7	My library offers training/consultation on open science (e.g., RDM, preprints, reproducibility).	2.745	1.3427
A8	We have documented workflows that improve research reproducibility (e.g., versioning, protocols).	2.702	1.4282
A9	I feel confident answering researchers' questions about open science.	2.957	1.3015
A10	Increasing open science support is a strategic priority in my library.	2.894	1.3061
Grand Mean/ SD	**Overall Awareness Level**	**2.8647**	**1.36333**

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Table 2 showed a moderate level of awareness and practice of OS principles. A5 with a mean of 3.11, SD=3.106 which indicates the capacity of librarians in advising on data sharing and metadata practices. While A8 had a mean of 2.70, SD=1.428 the lowest indicating limited engagements in establishing documented workflow to enhance research reproducibility. The result reflects a developing but not yet fully established culture of OS support within all the surveyed institutions.

Table 3 —: **Librarians AI Readiness** (RQ2)

Item	**Statement**	**Mean**	**SD**
B1	I can identify practical AI use cases in library services (e.g., metadata, discovery, analytics).	2.96	1.373
B2	I feel confident experimenting with AI tools in my work.	3.17	1.34
B3	I have received training (formal/informal) related to AI in the past 24 months.	3.19	1.30
B4	My library provides access or sandbox for AI tools (e.g., LLMs, analytics, automation).	2.936	1.3578
B5	My leadership encourages AI exploration/innovation.	2.745	1.3100
B6	I can evaluate AI outputs for accuracy, bias, and reliability.	3.149	1.3018
B7	I understand the ethical and legal issues of AI (privacy, IP, bias).	3.106	1.3061
B8	I am willing to champion AI pilots/projects in my unit.	2.957	1.4136
B9	I expect AI adoption to improve service quality in my context.	3.340	1.3875
B10	I understand the basics of AI/ML relevant to librarianship.	3.489	1.4427

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Grand Mean / SD	**Over all AI Awareness and Practice Level**	**3.1042**	**1.35325**

Table 3 revealed that librarians had understanding of AI AND ML relevant to librarianship B10 with the highest mean of 3.49, SD=1.44. B9 mean 3.34, SD=1.39 reflects the optimism and positive perception on leveraging AI for service delivery. On the other hand, B3 had a mean 3.19, SD= 1.30 and B6 had a mean of 3.15, SD=1.30 which reveals the exposure to AI training by librarians and evaluation of AI generated outputs for bias and accuracy. The areas of concerns are B5 with mean 2.75, SD=1.31 which is a limited institutional leadership support for AI exploration and innovation, followed by B4 having a mean of 2.94, SD=1.36, B8 had a mean of 2.96, SD=1.41, which shows that the willingness to lead AI projects remains moderate. This implies constant and motivational gaps. The implication here is that practical implementation and support from the organizations are still minimal. There is a need for leadership support and continuous professional development.

Table 4— Data Science Skills (RQ3)

Item	**Statement**	**M**	**SD**
D1	I can clean and prepare datasets (e.g., handle missing values, formats).	2.778	1.2772
D2	I can compute descriptive statistics (counts, means, frequencies). I can create data	3.304	1.1901
D3	visualizations (charts, dashboards).	3.022	1.1830

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

D4	I can use at least one data tool (e.g., Excel advanced, R, Python, SPSS, Power BI).	3.213	1.2672
D5	I understand database concepts (SQL, tables, joins).	2.957	1.3666
D6	I can apply text/data mining (e.g., topic modeling, keyword extraction).	2.872	1.1909
D7	I can document and share reproducible analysis (notebooks, READMEs, metadata).	2.915	1.1947
D8	I can support research data management (data deposit, DOIs, metadata).	3.043	1.1788
D9	I can interpret statistical outputs for decision-making.	3.000	1.2854
D10	I actively update my data skills (courses, webinars, practice).	3.106	1.3389
Grand Mean/SD	**Overall Data Science Skills**	**3.021**	**1.24728**

The results in Table 4 reveal a **moderate level of data literacy and analytical practice** among respondents, with a **grand mean of 3.02** and a **standard deviation of 1.25**, with varied competency levels. The **highest mean (C2 = 3.30, SD=1.19)** suggests that respondents are most confident in performing **basic descriptive statistical analysis,** reflecting foundational quantitative literacy. Close scores for **C4 (3.21)** and **C10 (3.11)** indicate familiarity with **data tools** and a **willingness to continuously improve data skills** through self-learning or professional development. The **lowest mean (C1 = 2.78)** reveals limited competence in **data cleaning and**

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

preparation, a critical step for reliable analysis. Skills such as **data mining (C6 = 2.87)** and **documentation for reproducibility (C7 = 2.92)** also appear to be low.

Respondents show **a level of data competencies**, in basic analysis and visualization, but **limited expertise in advanced data handling, reproducibility, and mining techniques.** This finding suggests that **training and institutional support** are still needed to strengthen proficiency in data management, analytical reasoning, and the use of advanced tools.

Table 5— Research Participation (RQ4)

Item	**Statement**	**M**	**SD**
E1	I have co-designed research projects with faculty/researchers in the past 12 months.	2.830	1.3724
E2	I have co-authored research outputs (papers, datasets, preprints) in the past 12 months.	3.035	1.3805
E3	I provide ongoing research support to project teams (analysis, RDM, visualization).	2.830	1.3075
E4	DS/AI tools have facilitated collaboration across units/institutions.	2.702	1.2321
E5	My library actively participates in multi-institutional research initiatives.	2.936	1.2753
E6	I perceive that DS/AI capacity increases our collaboration with researchers.	2.872	1.2958
E7	I am recognized as a partner (not only support staff) in research projects.	2.894	1.3061

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

E8	We use shared platforms/workflows that streamline collaborative work (e.g., Git, OSF).	2.745	1.2063
Grand Mean/ SD	**Overall Research Participation**	**2.8555**	**1.297**

The highest engagement is the Co-authorship (M 3.035, SD=1.3805) showing a formal dissemination and collaboration, then the multi-institutional participation (M 2.936, SD=1.2753) indicating the partnership engagement. The area of weakness from this table is the data science and AI tools in cross-institutional collaboration (M=2,702, SD= 1.2321) which indicate a significant gap in the adoption of technology. Finally, the shared platforms/ workflows adoption (M=2.745, SD=1.2063) is lagging which indicated a barrier.

Table 6— **Institutional Support** (RQ5)

Item	**Statement**	**Mean**	**SD**
C1	My institution has policies/guidelines for open science and data sharing.	2.872	1.2268
C2	Our library has adequate infrastructure (repository, storage, analytics tools).	3.149	1.2680
C3	There is funding or time allocation for DS/AI and open science activities.	2.809	1.2272
C4	We have partnerships (internal/external) that strengthen open science services.	2.936	1,2407

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

C5	Staff can access regular training on DS/AI and open science.	2.979	1.3908
C6	Our performance metrics recognize and reward open science support.	2.872	1.3289
C7	There is IT support for DS/AI experimentation.	3.106	1.1838
C8	Ethical and legal compliance processes are clear for DS/AI and data sharing.	3.000	1.3022
Grand Mean/ SD	**Overall Institutional Readiness Level**	**2.965375**	**1.552**

The results in Table 6 indicate a **moderate level of institutional readiness** for supporting Data Science (DS), Artificial Intelligence (AI), and Open Science initiatives, with a **grand mean of 2.97** and a standard deviation of **1.55**, showing some variability among respondents. The **highest mean score (3.15)** indicates that respondents perceive relatively better availability of **infrastructure** (such as repositories and analytical tools) in their libraries. **(M = 3.11)** also the **presence of IT support** for DS/AI experimentation in some institutions scored high M=3.11. The **lowest mean score (M = 2.81)** highlights a **lack of funding and time allocation**, which is a major barrier to effective implementation of open science and AI initiative.

The findings reveal that despite some structures and supports (like IT infrastructure and ethical guidelines) exist, institutional frameworks, funding and staff incentives are not well developed. This implies that many libraries and institutions are still in the developing phase of DS/AI and

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Open Science integration. Strengthening policies, establishing sustainable funding, and promoting continuous staff training are critical for advancing institutional readiness and long-term success.

Discussion

The study examined the open science (OS) and data analysis skills of librarians in the era of AI, as well as the extent to which these variables influence institutional readiness and research engagement. Respondents affirmed having a reasonable understanding of AI and machine learning concepts, suggesting optimism and willingness to leverage emerging AI tools in library functions. With respect to the, results on data science skills, it shows that librarians possessed moderate data science skills, particularly in data literacy and basic analytics, enabling them to participate in research activities at a foundational level. This finding is inconsistent with Fuhr (2021), who reported relatively strong data science competencies among academic librarians. Conversely and with Ashiq (2022), who argued that the integration of data science into librarianship remains slow. Findings also reported that librarians demonstrated moderate awareness and practice of open science, reflecting their growing capacity in data sharing, metadata management, and related scholarly communication activities. This outcome aligns with the assertions of Ahmed and Othman (2021), Santos-Hermosa and Bote-Vericad (2024), and Samzugi (2025), who similarly reported increasing awareness of OS among librarians. The study also revealed active participation in collaborative research, with multi-institutional engagement and partnerships that reinforce the idea, also supported by Obim (2023) that observed that open science promotes collaboration across institutions. Institutional support was at a moderate level, inconsistent with (Tzanova, 2020) who reported that institutional support that involved implementation of expenses, institutional budget, research grants for open access initiatives was at a high level.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

The findings suggest that librarians are positioned at a developmental stage of AI readiness, characterized by growing awareness and foundational competencies rather than full preparedness. The relatively higher mean score for AI readiness reflects increasing exposure to AI concepts and tools within the library profession. However, the moderate levels observed across open science awareness and collaborative research participation indicate constraints in librarians' integration into open and networked research environments. Furthermore, the moderate level of institutional support highlights the lack of policy and trainings that may hinder sustained AI adoption. These findings collectively imply that while librarians are willing and moderately capable of engaging with AI practices, institutional and skills-based reinforcements are required to transition from readiness to effective implementation.

Conclusion

The conclude that librarians employed in Nigeria are willing and ready to Adopt AI but may be limited by some constrains from the moderate levels observed in the study. The moderate level of awareness and engagement with open science practices, and scholarly communication, suggesting an emerging capacity to support open research initiatives. Librarians also demonstrated a reasonable understanding of artificial intelligence and machine learning concepts, reflecting a positive tendency toward the integration of emerging technologies into library services. Furthermore, the presence of moderate data analysis skills, especially in data literacy skills and basic analytical competencies, enables librarians to contribute to research activities at a foundational level. The observed engagement in collaborative and multi-institutional research underscores the role of open science in enhancing research participation. Although librarians' competencies in open science, AI, and data analysis are still developing, they are progressively strengthening the skills required for institutional readiness in the AI research environment.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Recommendations

1. Library management and tertiary institutions should take proactive measures to equip librarian's skills set in open science practices, data analytics, and digital competencies. This includes establishing clear institutional policies and implementation frameworks that guide ethical and responsible use of AI in library environments.

2. Librarians should engage in continuous upskilling and reskilling to maintain professional relevance and enhance their effectiveness in delivering modern library services. Developing strong digital literacy, data management skills, and familiarity with AI-driven tools will be essential for meeting evolving user needs.

1. Library administrators should seek strategic collaborations with computer science bodies and professional associations such as Data Science Nigeria to provide targeted training, ensure ethical compliance, and support the sustainable integration of AI technologies into library operations.

Limitation of the Study

This study is limited by the small study population of 47 librarians who filled the questionnaire. The responses were also collected from WhatsApp professional groups that librarians in Nigeria belonged to, which limits the generalizability of the findings to Librarians in Nigeria especially librarians that are not technology savvy. In addition, the use of self-reported data may introduce response bias, as participants' perceptions may not fully reflect actual competencies or practices. Future research should employ larger and more diverse samples across multiple institutions through online and physical administration of questionnaires. Also, a mixed or longitudinal

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

method is recommended for a robust and generalizable insights into librarians' open science, AI, and data analysis competencies.

References

Achra, R. (2023). Review on Role of Data Science in Library and Information Science. *International Journal of Innovations and Research Analysis*, *3*(1), 115–118.

Ahmed, M., & Othman, R. (2021). Readiness towards the implementation of open science initiatives in the Malaysian Comprehensive Public Universities. *The Journal of Academic Librarianship*, *47*(5), 102368. https://doi.org/10.1016/j.acalib.2021.102368

Ashiq, M., & Warraich, N. F. (2023). A Systematized Review on Data Librarianship Literature: Current Services, Challenges, Skills, and Motivational Factors. *Journal of Librarianship and Information Science*, *55*(2), 414–433. https://doi.org/10.1177/09610006221083675

Bertram, M. G., Sundin, J., Roche, D. G., Sánchez-Tójar, A., Thoré, E. S. J., & Brodin, T. (2023). Open science. *Current Biology*, *33*(15), R792–R797. https://doi.org/10.1016/j.cub.2023.05.036

Carroll, C. O., Kamerlin, C. L., Brennan, N., & Hyllseth, B. (2017). *Providing Researchers with the Skills and Competencies they Need to Practice Open Science*.

Chagas, a. (2018). Haves and have nots must find a better way: The case for open scientific hardware. *PLos Biology*, *16*(9).

Chui, M., Manyika, J., & Miremadi, M. (2018). *The Impact of AI on Data Analytics Automation and Intelligence in Decision Making*.

Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data – evolution, challenges and research agenda. *International Journal of Information Management*, *48*, 63–71. https://doi.org/10.1016/j.ijinfomgt.2019.01.021

Fagbola, O. O., & Egbebi, O. F. (2025). Librarians' readiness towards artificial intelligence utilization for service delivery in university libraries in Kwara State, Nigeria. *Journal of Information Studies & Technology (JIS&T)*, *2025*(2). https://doi.org/10.5339/jist.2025.13

Fida Ali, Shahnoor, Neha Munir, & Muhammad Abubakar. (2025). Readiness for Adopting Artificial Intelligence and Emerging Technologies in Academic Libraries of Pakistan. *The Critical Review of Social Sciences Studies*, *3*(1), 1146–1160. https://doi.org/10.59075/y8sewa87

Fuhr, J. (2022). Developing Data Services in Academic Libraries. *College &Research Libraries*, *83*(3).

Isiaka, A. O. (2023). Application and Use of Artificial Intelligence (AI) for Library Services Delivery in Academic Libraries in Kwara State Nigeria. *Library Philosophy and Practice*. https://digitalcommons.unl.edu/libphilprac/7978

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library

Kankam, P. K., Acheampong, L. D., & Dei, D. J. (2024). Dissemination of scientific information through open access by research scientists in a developing country. *Heliyon*, *10*(7), e28605. https://doi.org/10.1016/j.heliyon.2024.e28605

Luo, J., & Tang, R. (2024). Data competency for academic librarians: Evaluating present trends and future prospects. *The Journal of Academic Librarianship*, *50*(4), 102897. https://doi.org/10.1016/j.acalib.2024.102897

Mielkov, Y. (2023). The Paradigm of Open Science and Democratization of the Research Activity of Universities. *Paradigm of Knowledge*, *3*(57). https://doi.org/10.26886/2520-7474.3(57)2023.4

Mishra, S., Gupta, P., Mishra, M., & Ahmad, M. (2025). Artificial Intelligence versus Healthcare and Medical System: An Editorial. *Open Access Journal of Data Science and Artificial Intelligence*, *3*(1). https://doi.org/10.23880/oajda-16000160

Ogunbeni, J. I., Obiamalu, A. R., Semambo, S., & Bazibu, C. M. (2018). The roles of academic libraries in propagating open science. *Information Development*, *34*(2), 113–121. https://doi.org/10.1177/0266666916678444

Onyebinama, C. O., Okere, O. O., Ayo-Olafare, F. R., & Chima-James, N. (2024). Open science and academic libraries in Africa. *Library and Information Perspectives and Research*, *6*(1), 249–261. https://doi.org/10.47524/lipr.v6i1.250

Orubebe, E. D., Oloniruha, E. A., & Oladokun, B. D. (2025). Adoption and Utilization of Artificial Intelligence in Academic Libraries. *International Journal of Knowledge Content Development*, *15*(3), 25–35.

Oyedipe, W. J., Adekunmisi, S., & Akinbode, R. (2017). Awareness and Usage of Open Access among University Lecturers in Nigeria. *New Media and Mass Communication*, *63*, 6–18.

Santos-Hermosa, G., & Boté-Vericad, J.-J. (2024). Spanish academic libraries' perceptions of Open Science. Drivers and barriers, level of knowledge and training. *Education for Information*, *40*(2), 139–162. https://doi.org/10.3233/EFI-220069

Semeler, A. R., Pinto, A. L., & Rozados, H. B. F. (2019). Data science in data librarianship: Core competencies of a data librarian. *Journal of Librarianship and Information Science*, *51*(3), 771–780. https://doi.org/10.1177/0961000617742465

Tekale, R. R. (2025). The Use of AI in Libraries: Transforming Access and Management. *International Research Journal of Education and Technology*, *8*(9), 186–190.

Received: October 15, 2025. Accepted: December 16, 2025
@ Author(s) 2025. Published by Kaduna State University Library