Research Trend in Management and Technology

Digital Preservation Challenges in Nigerian University Libraries and the Development of an Open-Source Preservation Software Model

Agatha Ujunwa Nnatu[1], Emmachika Onyebuchi Lynda[2], Ngozi Njideka Okechukwu[3]

[1]Librarian, Faculty of Arts Library, Nnamdi Azikiwe University Awka.
[2]Librarian, Digital library section, Nnamdi Azikiwe University Awka.
[3]Librarian, Faculty of Pharmaceutical Science Library. Nnamdi Azikiwe University, Awka.

Abstract

The rapid growth of digital resources in Nigerian university libraries has outpaced the development of effective preservation strategies, leading to challenges such as data loss, technological obsolescence, and limited institutional support. The study used a descriptive survey design to examine perceptions of digital preservation practices, challenges, and open source software adoption in Nigerian university libraries. The area of study covered selected Nigerian universities. The population comprised librarians and Library and Information Science students. A sample of sixty five respondents (23 males, 42 females) was selected through convenience sampling. Data were collected using a structured questionnaire measured on a four point Likert scale. The instrument was validated by experts and showed acceptable reliability (Cronbach alpha = 0.78). Data collection was conducted online via Google Form. Descriptive statistics and ANOVA were used for data analysis. The findings show minor gender based variations in digital preservation practices, challenges, capacity, and tool usage in Nigerian university libraries. Females slightly rated formal policies (3.40), standardized formats (3.38), and backups (1.95) higher than males (3.26, 3.30, 1.57), while males perceived routine checks more positively (2.30). Major problems in both sexes consist of lack of good ICT infrastructure (3.35 3.40) and lack of funding (2.98 3.22). Women viewed greater ability to adopt open-source software (3.48) and familiarity with other tools like DSpace (2.60). The results of ANOVA in all hypotheses showed a statistically significant finding of no gender differences ($p>0.05$). Based on this, the research concludes that digital preservations in Nigerian university libraries are limited by the lack of finances, infrastructure, and expertise. Intense institutional backing, intensified employee development, improved information and technology infrastructure, and the implementation of tailored open-source preservation systems therefore become fundamental corrective interventions.

Keywords: Digital preservation, open-source software, libraries in the Nigerian universities, ICT infrastructure, challenges in preservation.

Introduction

Digital preservation is a pressing task of university libraries, where academic communication is turning more and more reliant on electronic sources. The need to preserve digital information to enable future access has been exacerbated in Nigerian university libraries as institutional repositories, electronic journals, and digitised local material continue to increase. The term digital preservation, as described by researchers like Sambo et al. (2017) is made up of those undertakings and techniques that help maintain digital content and make it available, authentic and usable over time despite changes in technology and media destruction. Nonetheless, the literature has repeatedly shown that Nigerian university libraries face chronic challenges that frustrate successful digital preservation and hence the need to develop an open-source model of preservation software tailored to the context needs.

An open-source preservation software model refers to a paradigm of managing and preserving digital information with the help of software whose source code may be used, edited, and distributed freely. This paradigm is more inclined to cost-efficiency, flexibility, transparency and community collaboration. It encourages institutions to adapt the preservation tools to their local requirements without paying the high cost of licensing, according to David et al. (2023). These models provide essential capability including ingress, metadata management, storage, integrity checking and long-term access along with supporting a common development, cyclic enhancement and sustainability, in the context of resource-limited environments such as academic and research libraries.

A persistent challenge identified in the literature is the inadequacy of technological infrastructure in Nigerian academic libraries. Studies show that limited access to servers, storage facilities, and modern digital preservation systems constrains effective management of digitized resources (Enemuo & Muogbo, 2023). In a related study, Okafor et al. (2023) note that weak ICT infrastructure undermines digital learning initiatives. Power instability and unreliable internet connectivity further exacerbate risks of data loss (Muogbo & Nnoli, 2025; Anakpua et al, 2025), while broader ICT limitations affect educational and entrepreneurial outcomes (Muogbo & Obiefoka, 2022; Enemuo et al., 2023). Sambo et al. (2017) noted that most libraries use low-quality storage equipment without a well-organized backup plan, thus undermining long-term preservation initiatives. Such infrastructural shortfalls destabilize the sustainability of digital projects and hamper systematic preservation planning.

Financial constraints also prominently feature in the literature. Digital preservation requires long-term funding in equipment purchases, software upkeep, employee education, and system creation. According to Rhima (2023), the majority of Nigerian university libraries are under restrictive budgets that focus on delivering services in the short term instead of long-term preservative goals. As a result, preservation efforts are often reactive, but not strategic. Without specifically designated funding streams, libraries are not positioned to implement thorough preservation structures or to sustain already existing digital repositories. The issue of human capacity also complicates the digital preservation of libraries in Nigerian universities. According to multiple studies, librarians have low technical competence in relation to metadata standards, digital curation processes, and repository handling (Oladotun et al., 2023). Oluwumi and Omotayo (2024) observed that despite the level of awareness about the digital preservation concepts among the library staff, there is still a weak practical implementation because of the lack of training and exposure to emergent technologies. This skills shortage limits the capacity

of libraries to develop and maintain an efficient preservation system, despite the very basic infrastructure.

Lack of formal digital preservation policies is also another major problem. Nigeria University libraries do not have a policy that establishes preservation priorities, file formats, access control, and disaster recovery procedures in writing (Sambo et al., 2017). According to Makinde et al. (2025), digital preservation is disjointed, relying on individual efforts instead of on commitment of organisations, without institutional policy support. The lack of policy frameworks also restricts the accountability and decreases the involvement of preservation activities in the larger information-management strategies of the university. To address these problems, the literature is now increasingly giving support to the integration of open-source preservation software as an alternative solution to the Nigerian university libraries. Open software has been found to be cost-effective, flexible, and community-based in development, which makes it appropriate to institutions with limited financial and technical resources (Price-Whelan et al., 2022). Digital storage, sharing, and preservation of academic material have become common in the academic world based on platforms like DSpace (DSpace, 2025). Its modular design allows libraries to tailor functionality to the local usage and does not cost them a lot of money to do so.

Other open-source projects, including Archivematica and LOCKSS offer extra preservation services, including workflow automation, integrity checks, and distributed preservation services. They are in line with international best practices, and help libraries to manage risks related to information loss and technology obsolescence (Archivematica, 2025; LOCKSS, 2025). Such tools can make preservation capacity stronger in case they are combined with institutional repositories and improve access to long-term digital resources. According to the literature, the establishment of an open-source model of preservation software in the context of Nigerian university libraries should not be a process that only involves adoption of new software. The rationale behind the specific study of the issue of digital preservation in the libraries of the Nigerian universities is the persistent discrepancy between the booming growth of online content and the ability to keep it intact and accessible in the future. Nigerian institutions are increasingly relying on the electronic theses, institutional repositories and digitised local materials; however, research has shown that preservation practices are weak, informal and unevenly undertaken (Sambo et al., 2017; Rhima, 2023). The available studies mostly focus on pinpointing the issues, which include inappropriate infrastructure, deficient funding, shortage of qualified staff and absence of preservation policies, without formulating practical and flexible solutions to suit the Nigerian environment.

Further, although the international literature has highlighted the usefulness of open-source preservation tools in terms of sustainability and cost-effectiveness, Nigerian-based studies tend to mention these tools at most descriptively, and not as a framework that can be used to develop a coherent software model that aligns with local institutional realities (Ahammad et al., 2024; Makinde et al., 2025). This creates a clear gap between theoretical awareness and applied preservation frameworks. In addition, limited attention has been given to institutional readiness and perceived capacity to adopt open source preservation solutions, particularly within resource constrained environments. Therefore, this study is needed to bridge the gap between identified digital preservation challenges and the development of a context appropriate open source preservation software model that can strengthen policy formulation,

guide practice, and support sustainable access to digital academic resources in Nigerian university libraries.

Purpose of the Study

The main purpose of this study is to examine the perception of librarians and library and information science (LIS) students regarding digital preservation challenges in Nigerian university libraries and the development of an open-source preservation software model. Specifically, this study seeks to:

1. examine respondents' perceived digital preservation practices currently used in Nigerian university libraries based on the gender of the respondents.
2. identify the perceived challenges affecting digital preservation in Nigerian university libraries as reported by male and female respondents.
3. determine respondents' perceived capacity of Nigerian university libraries to adopt open-source digital preservation software based on gender.
4. identify respondents' perceived availability and use of open-source digital preservation tools in Nigerian university libraries based on gender.

Research Questions

The study was guided by the following research questions:

1. What digital preservation practices are perceived to be used in Nigerian university libraries based on the gender of the respondents?
2. What challenges are perceived to affect digital preservation in Nigerian university libraries as reported by male and female respondents?
3. What is the perceived capacity of Nigerian university libraries to adopt open-source digital preservation software based on the gender of the respondents?
4. What open-source digital preservation tools are perceived to be used in Nigerian university libraries based on the gender of the respondents?

Hypotheses

H01: There is no significant difference in respondents' perceived digital preservation practices in Nigerian university libraries based on gender.

H02: There is no significant difference in respondents' perceived challenges affecting digital preservation in Nigerian university libraries based on gender.

H03: There is no significant difference in respondents' perceived capacity of Nigerian university libraries to adopt open-source digital preservation software based on gender.

H04: There is no significant difference in respondents' perceived use of open-source digital preservation tools in Nigerian university libraries based on gender.

Method

Research Design

The current research employed descriptive survey research design which was considered the most appropriate in interrogating the views, opinions, and attitudes of the respondents in their natural academic environment. This structure helped in a methodical collection of quantitative data on digital preservation practices, the challenges faced by these and adoption of open-source digital preservation software in Nigerian university libraries. The research design allowed gender-based comparisons without controlling any of the independent variables thus being a true reflection of the actual world conditions and providing a precise picture of the views of respondents regarding the problem of digital preservation.

Area of the Study

The geographic area of the study covered the Nigerian university libraries, which are the main locations of scholarly information and digital resources. Such libraries play a critical role in teaching, learning, and research provision by provision of electronic collections and digital services. Nigerian university libraries were specifically identified due to the growing attention given to the long-term sustainability of digital resources, limited infrastructure, and the growing interest in open-source solutions as a way of realizing sustainable digital preservation in the higher-education community.

Population of the Study

A subsample of Nigerian universities was used, with university librarians and Library and Information Science (LIS) students being the target population. Librarians were added since they directly deal with digital resources management, organization, and preservation; students of LIS were considered relevant because of their academic exposure to notions of digital librarianship and preservation. This group of people therefore provided informed insights into current practices, current issues, and institutional strengths with regards to digital preservation in university libraries.

Sample and Sampling Technique.

A total of sixty-five (65) respondents were chosen (twenty-three 23 male, forty-two 42 female). The researchers used convenience sampling strategy which helped to find respondents who were easily available and willing to respond. This methodology was considered to be suitable due to the temporal and logistical limitations, yet, also provided that the participants were knowledgeable and experienced enough in the context of digital preservation activities in the university libraries.

Data Collection Instrument.

A structured questionnaire carefully developed to solicit data relevant to the study objectives was used to collect the data. This instrument probed some of the fundamental areas including digital preservation practices, barriers to preservation efforts, the ability to embrace open-source preservation software, and the use of open-source solutions. The scale was four-pointers, thus allowing the respondent to indicate different levels of agreement, and stabilizing the unity among respondents.

Instrument validation

The instrument will undergo validation to ensure the accuracy of the results obtained. Instrument validation included the face and content validation, with the experts in the field of Library and Information Science and measurement theory. These experts examined the

questionnaire questions to ensure that they were clear, relevant, and covered the research variables in totality. The final version of the questionnaire included recommendations based on the validation process, which made it even more capable of measuring perceptions associated with digital preservation practices and challenges.

Instrument Reliability.

The reliability was determined through the Cronbach alpha, a statistical test of consistency within the items of the questionnaire. The reliability coefficient was obtained as 0.78, which is an acceptable measure of consistency. This finding supports the consistency and reliability of the tool to measure the perceptions of the respondents and validates its ability to provide similar results in similar conditions.

Method of Data Collection

The data was gathered via the Internet using Google Forms, and that provided an opportunity to distribute and access the data in an efficient way, as the respondents represented different universities. The questionnaire was translated into electronic version and was spread through mail and popular social-media networks used in academic correspondence. This approach increased accessibility, dampened the necessity to be physically in touch, and reduced the cost and time factors. Detailed guidelines and an informed consent form were placed at the beginning of the form to ensure voluntary participation, anonymity, and confidentiality of respondents.

Method of Data Analysis

The analysis of data involved descriptive and inferential statistics. To answer the research questions, descriptive statistics (frequency counts, percentages, means, and standard deviations) were calculated. Inferential analysis entailed the use of Analysis of Variance (ANOVA) to test the hypotheses at the 0.05 level of significance. The data were tabulated and analyzed to indicate the existence or lack of statistically significant gender differences in perceptions of digital preservation and the use of open-source software.

Results

Table 1: Gender Distribution of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	23	35.4	35.4	35.4
	Female	42	64.6	64.6	100.0
	Total	65	100.0	100.0	

The gender composition of the respondents in Table 1 indicates a higher participation of females than males. Out of the total respondents (65), females accounted for the majority (42; 64.6%), while males constituted a smaller proportion (23; 35.4%). This distribution suggests that female respondents were more readily available or willing to participate in the study. The cumulative percentages further confirm that all respondents were adequately captured, with males contributing (35.4%) and females completing the total sample (100.0%).

Table 2: Distribution of Respondents by Category

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	University Librarian	7	10.8	10.8	10.8
	LIS Student	58	89.2	89.2	100.0
	Total	65	100.0	100.0	

Table 2 shows that the majority of the respondents were LIS students, who constituted a substantial proportion of the sample (58; 89.2%). In contrast, university librarians were fewer in number, accounting for only (7; 10.8%) of the respondents. This pattern indicates that students formed the dominant group in the study, which may reflect their higher availability or greater interest in the subject under investigation. The cumulative percentages confirm full representation of both respondent categories within the total sample (65).

Research question 1: What digital preservation practices are perceived to be used in Nigerian university libraries based on the gender of the respondents?

Table 3: Gender-Based Perception of Digital Preservation Practices in Nigerian University Libraries

	Gender	N	Mean	Std. Deviation	Std. Error Mean
The library has a formal digital preservation policy.	Male	23	3.26	.619	.129
	Female	42	3.40	.665	.103
Digital resources are regularly backed up.	Male	23	1.57	1.121	.234
	Female	42	1.95	1.229	.190
Standardized formats are used for storing digital materials.	Male	23	3.30	.470	.098
	Female	42	3.38	.539	.083
Digital materials are routinely checked for data loss or corruption.	Male	23	2.30	1.329	.277
	Female	42	1.98	1.316	.203
Library staff are trained on digital preservation practices.	Male	23	3.04	.706	.147
	Female	42	3.10	.692	.107

The results in Table 3 indicate minor variations in perceptions of digital preservation practices across gender. Female respondents reported slightly higher agreement on the existence of a formal digital preservation policy (Male: 3.26; Female: 3.40) and the use of standardized storage formats (Male: 3.30; Female: 3.38). Females also rated regular backup of digital resources higher (1.95) than males (1.57). However, males perceived routine checks for data loss more positively (2.30) than females (1.98). Perceptions of staff training were generally similar (Male: 3.04; Female: 3.10), suggesting shared experiences across genders.

Research question 2: What challenges are perceived to affect digital preservation in Nigerian university libraries as reported by male and female respondents?

Table 4: Gender-Based Perception of Challenges Affecting Digital Preservation in Nigerian University Libraries

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Inadequate funding affects digital preservation in the library.	Male	23	3.22	.951	.198
	Female	42	2.98	.869	.134
Poor ICT infrastructure limits digital preservation activities.	Male	23	3.35	.487	.102
	Female	42	3.40	.767	.118
Lack of skilled personnel is a major challenge.	Male	23	3.00	.522	.109
	Female	42	3.33	.477	.074
Irregular power supply affects digital preservation efforts.	Male	23	3.22	.736	.153
	Female	42	3.17	.537	.083
Lack of institutional support hinders digital preservation initiatives.	Male	23	3.26	.619	.129
	Female	42	3.31	.563	.087

Table 4 shows that both male and female respondents perceive several challenges to digital preservation, with slight differences across gender. Males reported inadequate funding as a notable challenge (3.22), slightly higher than females (2.98). Both genders rated poor ICT infrastructure as a significant barrier, with females slightly higher (Male: 3.35; Female: 3.40). Females perceived lack of skilled personnel as more challenging (3.33) than males (3.00). Irregular power supply (Male: 3.22; Female: 3.17) and lack of institutional support (Male: 3.26; Female: 3.31) were similarly acknowledged, indicating shared recognition of these issues across genders.

Research question 3: What is the perceived capacity of Nigerian university libraries to adopt open-source digital preservation software based on the gender of the respondents?

Table 5: Gender-Based Perception of Nigerian University Libraries' Capacity to Adopt Open-Source Digital Preservation Software

	Gender	N	Mean	Std. Deviation	Std. Error Mean
The library has the technical capacity to adopt open-source software.	Male	23	3.26	.541	.113
	Female	42	3.48	.552	.085
Library staff and students are willing to use open-source preservation software.	Male	23	3.26	.449	.094
	Female	42	3.48	.505	.078
Library management supports the adoption of open-source digital solutions.	Male	23	3.26	.810	.169
	Female	42	3.21	.565	.087
	Male	23	3.09	.793	.165

ICT infrastructure can support open-source preservation software.	Female	42	3.31	.517	.080
Open-source software is cost-effective for digital preservation.	Male Female	23 42	2.00 2.43	.953 1.039	.199 .160

The data in Table 5 indicate that female respondents generally perceive a higher capacity for adopting open-source digital preservation software than males. Females rated the library's technical capacity higher (3.48) compared to males (3.26), and similarly, staff and student willingness was seen as greater by females (3.48) than males (3.26). Perceptions of management support were almost similar (Male: 3.26; Female: 3.21). ICT infrastructure was rated slightly higher by females (3.31) than males (3.09). Both genders perceived cost-effectiveness lower, though females (2.43) were more optimistic than males (2.00).

Research question 4: What open-source digital preservation tools are perceived to be used in Nigerian university libraries based on the gender of the respondents?

Table 6: Gender-Based Perception of Open-Source Digital Preservation Tools in Nigerian University Libraries

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Open-source software is currently used for digital preservation in the library.	Male Female	23 42	1.96 2.57	.928 1.085	.194 .167
Tools such as DSpace, Greenstone, or EPrints are familiar to users.	Male Female	23 42	1.91 2.60	.793 1.083	.165 .167
Open-source tools used are easy to manage and maintain.	Male Female	23 42	1.87 2.52	.869 1.042	.181 .161
Open-source preservation tools meet digital preservation needs.	Male Female	23 42	2.91 2.98	.996 .897	.208 .138
There is interest in expanding the use of open-source preservation tools.	Male Female	23 42	1.91 2.45	.793 1.017	.165 .157

Table 6 shows that female respondents generally perceive higher usage and familiarity with open-source digital preservation tools than males. Females rated current use of open-source software higher (2.57) compared to males (1.96), and also reported greater familiarity with tools such as DSpace, Greenstone, or EPrints (Female: 2.60; Male: 1.91). Similarly, females viewed the tools as easier to manage (2.52 vs. 1.87) and slightly more capable of

meeting preservation needs (2.98 vs. 2.91). Interest in expanding usage was also higher among females (2.45) than males (1.91), indicating a gender difference in perception and engagement with open-source tools.

Hypothesis 1: There is no significant difference in respondents' perceived digital preservation practices in Nigerian university libraries based on gender.

Table 7: ANOVA on Gender Differences in Perceived Digital Preservation Practices

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.060	1	1.060	.266	.608
Within Groups	251.155	63	3.987		
Total	252.215	64			

The ANOVA results in Table 7 indicate no significant difference in perceived digital preservation practices between male and female respondents. The F-value (0.266) with a significance level of 0.608 (p greater than 0.05) shows that gender does not influence perceptions of digital preservation practices in Nigerian university libraries. Based on this result, the null hypothesis, which states that there is no significant difference in perceived digital preservation practices based on gender, is accepted, confirming that both males and females share similar views.

Hypothesis 2: There is no significant difference in respondents' perceived challenges affecting digital preservation in Nigerian university libraries based on gender.

Table 8: ANOVA on Gender Differences in Perceived Challenges Affecting Digital Preservation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.321	1	.321	.095	.759
Within Groups	213.433	63	3.388		
Total	213.754	64			

The ANOVA results in Table 8 show no significant difference in respondents' perceptions of challenges affecting digital preservation based on gender. The between-groups variance (0.321) compared to within-groups variance (3.388) produced an F-value of 0.095, with a significance level of 0.759 (p greater than 0.05). This indicates that male and female respondents perceive challenges to digital preservation similarly. Therefore, the null hypothesis, which states that there is no significant difference in perceived challenges based on gender, is accepted.

Hypothesis 3: There is no significant difference in respondents' perceived capacity of Nigerian university libraries to adopt open-source digital preservation software based on gender.

Table 9: ANOVA on Gender Differences in Perceived Capacity to Adopt Open-Source Digital Preservation Software

	Sum of Squares	df	Mean Square	F	Sig.

Between Groups	3.326	1	3.326	.966	.329
Within Groups	216.889	63	3.443		
Total	220.215	64			

The ANOVA results in Table 9 indicate no significant difference in respondents' perceptions of Nigerian university libraries' capacity to adopt open-source digital preservation software based on gender. The between-groups variance (3.326) compared to within-groups variance (3.443) produced an F-value of 0.966, with a significance level of 0.329 (p greater than 0.05). This shows that both male and female respondents have similar views regarding the capacity of libraries. Therefore, the null hypothesis, which states that there is no significant difference based on gender, is accepted.

Hypothesis 4: There is no significant difference in respondents' perceived use of open-source digital preservation tools in Nigerian university libraries based on gender.

Table 10: ANOVA on Gender Differences in Perceived Use of Open-Source Digital Preservation Tools

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.225	1	3.225	.768	.384
Within Groups	264.621	63	4.200		
Total	267.846	64			

The ANOVA results in Table 10 indicate no significant difference in respondents' perceptions of the use of open-source digital preservation tools based on gender. The between-groups variance (3.225) compared to within-groups variance (4.200) produced an F-value of 0.768, with a significance level of 0.384 (p greater than 0.05). This suggests that both male and female respondents share similar views on the use of open-source tools in Nigerian university libraries. Therefore, the null hypothesis, which states that there is no significant difference based on gender, is accepted.

Discussion

The findings for Research Question 1 suggest that both male and female respondents share generally similar perceptions of digital preservation practices in Nigerian university libraries, though females reported slightly higher agreement on the existence of formal digital preservation policies (Female = 3.40; Male = 3.26) and the use of standardized formats (Female = 3.38; Male = 3.30). This finding agreed with evidence that formal policy frameworks and systematic preservation processes are important for sustaining digital assets in academic settings (Abdullahi, Amao, & Abubakar, 2024). However, the relatively low responses for regular backups (Female = 1.95; Male = 1.57) contrast with broader preservation literature that emphasizes backup and replication as foundational practices for digital resource safety (Ezema & Eze, 2024). In a related study, Omoju and Omotayo (2024) reported that digital preservation practices in federal Nigerian university libraries include replication and migration, but policy

implementation and technical manpower remain inconsistent, which mirrors the mixed perceptions in this study regarding routine data integrity checks.

For Research Question 2, both genders perceived similar challenges affecting digital preservation, such as inadequate funding, poor ICT infrastructure, and lack of skilled personnel. The results of these observations are in line with the results obtained by Rhima (2023), who found that a lack of proper infrastructure, technological obsolescence, insufficient funding, and limited power supply are the main barriers to successful digital preservation in Nigerian academic libraries. Likewise, Gür and Türel (2023) document that ICT limitations, lack of funds, and absence of qualified staff significantly inhibit the long-term storage of information in libraries, which means that these factors are widely recognized regardless of the perceived gender disparity. In contrast, research from other contexts has highlighted that successful preservation initiatives often hinge on comprehensive strategies that align national policy, institutional commitment, and technical training, further illustrating the gap in Nigerian settings.

Research Question 3 examined perceived capacity to adopt open-source preservation software. Female respondents generally reported higher perceptions of technical capacity (Female = 3.48; Male = 3.26) and willingness to use open-source tools. This finding agreed with literature suggesting that awareness and familiarity with open-source repository platforms (e.g., DSpace, Greenstone) can positively influence perceptions of readiness and adoption potential in academic libraries. Although specific recent research on open-source adoption is limited, broader studies indicate that openness to technologically enabled preservation correlates with exposure and training (Oyelude & Alonge, 2023). In contrast, cost-effectiveness perceptions were low for both genders, reflecting wider evidence that while open-source solutions are free to acquire, the overall costs of implementation and maintaining infrastructure may still present barriers, particularly where funding and ICT competencies are lacking.

For Research Question 4, female respondents reported higher perceptions of familiarity with and use of open-source tools such as digital repositories, with higher means for current software usage and tool ease of use. This finding agreed with Adam and Kiran (2021) who noted that positions institutional repository adoption as a driver for improving access, visibility, and long-term preservation of scholarly outputs, particularly when supported by training and institutional commitment. Conversely, the statistically equal ratings of both male and female participants on the actual tool engagement suggest that the increased awareness has not resulted in the active use of the tool by the majority. This finding, in stark contrast to extant scholarship, claims a wide adoption of tools like DSpace in institutions in which repositories are well-established and policy-based.

In all four hypothesis tests, the pattern of non-significant gender differences is evident and indicates that gender does not have a statistically significant impact on perceptions of digital-preservation practices, challenges, or the potential to adopt open-source software, or the use of open-source tools. This finding confirms the findings of Masenya and Ngulube (2020), who assume that organisational context, resource provision, and policy frameworks have a more powerful effect on digital-preservation attitudes than demographic factors such as gender in academic library milieus. As a result, population-based policies should not be a priority when it comes to strengthening digital conservation in Nigerian university libraries because systemic change would be more beneficial than demographic stratification.

Conclusion

This research examined the current digital-preservation methods, the accompanying issues, and the perceived preparedness of the Nigerian university libraries to implement open-source preservation software, all with a reasonable respect to the gendered perspectives. As the analysis made clear, despite the presence of formal policies, standardised forms and staff training programmes, there still exist substantial implementation gaps, especially in the areas of regular backup and loss-monitoring processes. Both genders mentioned lack of adequate funding, inadequate ICT infrastructure, and shortage of skilled staffs as the major impediments to preservation efforts. Although there is a moderate tendency to implement open-source preservation tools, there is a limited practice and implementation, which highlights the necessity of systematic training, institutional support, and infrastructure building. Besides, the lack of perceivable gender disparities in judgements of practices, difficulties, ability, or use of tools highlights the significance of systemic and organisational factors rather than the demography of setting digital-preservation results.

Based on the foregoing, the Nigerian university libraries need to embark on a concerted approach to digital preservation that includes development and deployment of context-sensitive open-source software, delivery of extensive training programs among staff and patrons, development of sustainable ICT infrastructure and definition of explicit institutional policies. The implementation of these actions will help to improve the long-term accessibility of digital resources, their reliability, and usability, as well as promote cost-effective and sustainable preservation.

References

Abdullahi, A., Amao, M. A., & Abubakar, U. (2024). *Digital preservation practices in academic libraries in Nigeria*. *International Journal of Education and Evaluation (IJEE)*. Vol 10. No. 4. 465- 473.

Adam, U. A., & Kiran, K. (2021). Driving forces behind the management of Institutional Repositories: Qualitative evidences. *Malaysian Journal of Library and Information Science*, *26*(3), 33-56.

Ahammad, N., Saiful Bahri, F. D., & Husaini, H. (2024). Exploring the open-source impact on Bangladesh academic library service sustainability. *Journal of Information, Communication and Ethics in Society*, *22*(4), 478-493.

Anakpua, B.C., Inweregbuh, O.C., Odimkpa, C.O., Enemuo, C.J., Ofozoba, C.A., Isidi, P.A., Muogbo, U.F., Nnalue, O.H., Obiadazie, R.E. and Okudo, O.C., (2025). Enhancing STEM Education Through AI-Driven Service-Learning: Fostering Student Understanding of Nanotechnology-Based Green Materials For Sustainability. *International Journal of Environmental Sciences*, *11*(20s), p.2025.

Archivematica. (2025). Open source digital preservation system. Retrieved 17/01/25 from https://www.archivematica.org/en/

David, I., Latifaj, M., Pietron, J., Zhang, W., Ciccozzi, F., Malavolta, I., Raschke, A., Steghöfer, J.P. and Hebig, R., 2023. Blended modeling in commercial and open-source model-driven software engineering tools: A systematic study. *Software and Systems Modeling*, *22*(1), pp.415-447.

DSpace. (2025). Build an open digital repository. Retrieved 17/01/25 from https://dspace.org

Enemuo, C. J., & Muogbo, U. F. (2023). Extent of awareness and adoption of zoom technology in teaching and learning among lecturers' in colleges of education, Anambra state. *Int'l Journal of Education Research and Scientific Development*, *2*(2), 12-12.

Enemuo, C. J., Muogbo, U. F., & Adigwe, I. P. (2025). *Extent of computer literacy among junior secondary school students in computer studies in Ebonyi State*. IRASS Journal of Multidisciplinary Studies, 2(4), 32–41.

Ezema, I. J., & Eze, J. U. (2024). Status and challenges of institutional repositories in university libraries in South-East Nigeria: Implications for visibility and ranking of Nigerian universities. *The Journal of Academic Librarianship*, *50*(2), 102834.

Gür, D., & Türel, Y. K. (2022). Parenting in the digital age: Attitudes, controls and limitations regarding children's use of ICT. *Computers & Education*, *183*, 104504.

LOCKSS (2025). Lots Of Copies Keep Stuff Safe.. Retrieved 17/01/25 from https://www.lockss.org/

Makinde, E. T., Obanigwe, J. I., Otaiku, C. O., & Tyoyila, S. B. (2025). Integration of artificial intelligence (AI) driven security measures in library systems. *Journal of Library Services and Technologies*, *7*(2), 142-153.

Masenya, T. M., & Ngulube, P. (2020). Factors that influence digital preservation sustainability in academic libraries in South Africa. *South African Journal of Libraries and Information Science*, *86*(1), 52-63.

Muogbo, U. F., & Nnoli, J. N. (2025). *Negative influence of ICT on academic performance of junior secondary school students in Nnewi North LGA of Anambra State*. Unizik Journal of STM, 8(2).

Muogbo, U. F., & Obiefoka, A. O. (2022). *Impact of information and communication technology on entrepreneurial opportunities among secondary school students in Anambra State*. International Journal of Advanced Academic & Educational Research, 1.

Okafor, C.F., Enemuo, C.J., Anakpua, B.C., Muogbo, U.F., Okpara, B.A., Francis-Mario, C. and Umezulike, F.O., (2023). Blended Learning for Enhancing Mathematics Retention and Conceptual Understanding: Implications for STEM Teachers. Nanotechnology Perceptions, 19.

Oladotun, A. P., Aliyu, A., & Jega, A. M. (2023). Perspectives in Preservation of Digital Materials in Libraries: Skills and Competencies. *International Journal of Research and Innovation in Social Science*, *7*(6), 1096-1101.

Omoju, O. J., & Omotayo, F. O. (2024). Digital Preservation Practices in Federal University Libraries in Southwestern Nigeria. retrieved 17/01/26 from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?params=/context/libphilprac/article/15699/&path_info=OMOJU___OMOTAYO_2024___Digital_preservation_practices.pdf

Oyelude, A. A., & Alonge, A. J. (2023). *Teaching digital preservation and curation in LIS schools in Nigeria*. *IFLA Publications*. Retrieved 17/01/2026 from https://repository.ifla.org/items/f2289036-a2c2-4aa7-ac4c-5e1c4d6effad/full

Price-Whelan, A.M., Lim, P.L., Earl, N., Starkman, N., Bradley, L., Shupe, D.L., Patil, A.A., Corrales, L., Brasseur, C.E., Nöthe, M. and Donath, A., 2022. The Astropy Project:

sustaining and growing a community-oriented open-source project and the latest major release (v5. 0) of the core package. *The Astrophysical Journal*, *935*(2), p.167.

Rhima, T. E. (2023). Preservation of Digital Information Resources in Selected University Libraries in Delta State, Nigeria. *Communicate: Journal of Library and Information Science*, *25*(2), 187-205..

Sambo, A. S., Urhefe, E. A., & Ejitagha, S. (2017). A survey of digital preservation challenges in Nigerian libraries: Librarians' perspectives. *International Journal of Digital Curation*, *12*(1), 117-128.