

## Integration of innovative technologies for effective library service delivery in Nigeria

Research – Full text

Received: 12.08.2024

Accepted: 23.02.2025

Published: 31.08.2025

**Augusta Chioma Ezeabasili (PhD.)**

Nnamdi Azikiwe University, Department of Library and Information Science, Awka, Anambra State, Nigeria

[ac.ezeabasili@unizik.edu.ng](mailto:ac.ezeabasili@unizik.edu.ng)

Copyright (c) 2025,  
Augusta Chioma  
Ezeabasili,  
Ogagaoghene Uzezi  
Idhalama

**Ogagaoghene Uzezi Idhalama (CLN)**

Ambrose Ali University, Faculty of Education, Department of Library and Information Science, Ekpoma, Edo State, Nigeria

[idha.lama@aauekpoma.edu.ng](mailto:idha.lama@aauekpoma.edu.ng)



This work is licensed  
under a Creative  
Commons Attribution  
4.0 International  
License.

### Abstract

This study investigated the integration of innovative technologies for effective library services delivery in Nigeria. Five specific objectives guided the study. Descriptive survey research design was adopted for this study. The population of the study consists of the practicing librarians who are members of the Nigeria Library association (NLA) Google group official online platform for librarians in Nigeria. The instrument was converted to an online survey using Google form, the online link was posted on the NLA platforms soliciting responses from practicing librarians who are members of the platform. The survey response summary show that 118 practicing librarians participated in the study. The data were retrieved and analyzed using descriptive analysis of tables, frequencies, percentages, mean ratings and standard deviation. The findings revealed that out of the 10 listed innovative technologies for effective library service delivery in Nigeria, more than 50% of practising librarians are aware of four which include: Artificial Intelligence technology, D-space, Social media and Internet of things (IoT), others are not aware of the remaining six, this implies that librarians in Nigeria are aware of just few of the innovative technologies that aids in effective library services delivery. The findings also showed that they have integrated the four innovative technologies they are aware of and they have been very effective in library services delivery. From the findings, a lot were discovered including challenges faced by librarians in integrating innovative technologies in libraries. It was concluded that since the few innovative technologies integrated in Nigerian libraries have been found to improve a lot of services at the library, it can be generalized that they are very effective in library services delivery only if the identified challenges could be dealt with.

### Keywords

Libraries, Librarians, Innovative Technologies, library services, Integrations

## Introduction

Libraries have long been significant institutions for gathering, preserving, and disseminating knowledge. To improve service delivery, libraries must now incorporate cutting-edge technologies into their daily operations due to the rapid advancement of technology. According to Oyewusi et. al. (2021), over the past few years, there has been a significant shift in libraries towards embracing technology to enhance their services and resources and some of these are digital Collections and Access, online Catalogs and Databases, virtual Reference Services, maker Spaces and Technology Labs, data Management and Digital Literacy and others. Manjunatha and Kumar (2020) discovered in their study that both male and female librarians are aware of smart technologies that aid in library services delivery, which are web based technology (webopac technology), RFID technology and artificial intelligence technology (robots). Effective integration of these technologies is crucial in Nigeria, where libraries are essential for facilitating access to information and advancing education. With a focus on recent advancements and their effects on library operations and users, this study aims to investigate how innovative technologies can be effectively integrated for the delivery of library services in Nigeria. The need to increase effectiveness, accessibility, and user experience is what motivates libraries to integrate cutting-edge technologies. Utilizing cloud computing is one such innovation that enables libraries to store and gain access to materials hosted on distant servers. Because of its scalability and ability to do away with physical storage space, this technology enables libraries to accommodate expanding collections. The sharing of resources and expertise is made possible by cloud computing, which also facilitates collaborative efforts between libraries (Ojo, 2021).

The use of mobile applications (apps) is another cutting-edge technology that is revolutionizing library service delivery. Utilizing smartphones give users convenient access to library materials and services as users of mobile apps can browse library catalogs, access e-books and e-journals, and even get real-time alerts about events or new acquisitions. This technology enables libraries to provide services outside of their physical location and to a wider audience (Anunobi and Egbom, 2020). The provision of library services is also undergoing a revolution thanks to the integration of artificial intelligence (AI) technologies. For instance, libraries can offer users immediate and individualized assistance through chatbots powered by AI. These virtual assistants can provide quick access to information, respond to frequent questions, and even suggest resources based on user preferences. Natural language processing is supported by AI technologies as well, enabling more precise and effective search functionality within library catalogs (Adewumi, 2021). The Internet of Things (IoT) has also emerged as a technology that is revolutionizing libraries. IoT enables real-time resource usage monitoring and inventory management for libraries by allowing them to connect physical objects, such as bookshelves, to the internet. In order to make borrowing and tracking of materials easier, a subset of IoT called RFID (Radio Frequency Identification) technology has been widely adopted for library management. IoT technologies help libraries deliver better services by streamlining operations, increasing effectiveness, and improving user experience (Idhalama, Igbinovia, & Ezeabasili, 2021).

In addition, the fusion of data analytics and data visualization technologies provides insightful information about user behavior, preferences, and needs. To make data-driven decisions about collection development, resource allocation, and service improvement, librarians can

effectively analyze user data. Using interactive and user-friendly formats to display data enables librarians to effectively communicate information, increasing user engagement and comprehension (Salami & Agboola, 2021). In Nigeria, integrating these cutting-edge technologies into library service delivery presents both opportunities and difficulties. On the one hand, effective application of these technologies can increase information access, improve user experiences, and broaden the scope of libraries. However, these technologies must be adopted and put into use, which necessitates spending on infrastructure, supplies, and users' and librarians' digital literacy training. A challenge in ensuring equitable access to cutting-edge library services is the digital divide, especially in rural areas (Adewole & Oreyomi, 2021). This research will advance our understanding of the best practices and implementation strategies by examining how cutting-edge technologies can be incorporated into the delivery of library services. For libraries, librarians, and policymakers in Nigeria, it will offer perceptions, suggestions, and doable actions to improve service delivery and close the digital divide. The results will add to the ongoing conversation about how technology is changing library services and how that affects education and information access.

Incorporating cutting-edge technologies is changing how libraries deliver services in Nigeria, enhancing effectiveness, accessibility, and user experiences. There are many opportunities to improve library operations and reach new audiences thanks to cloud computing, mobile applications, AI technologies, IoT, and data analytics. But there are still issues with infrastructure, digital literacy, and ensuring equal access. In order to support the ongoing development of library services in Nigeria, this research will examine some of these complexities and offer recommendations for efficient technology integration. Conclusively, the problem to be researched is the lack of integration of innovative technologies in Nigerian libraries, hindering effective service delivery and limiting access to information and resources in a digital age. This study is significant in addressing the digital divide and enhancing information access for the population in Nigeria, where technological advancements play a vital role in education and research.

## Objectives

- 1) To explore librarians' awareness of innovative technologies for effective library service delivery in Nigeria.
- 2) To investigate innovative technologies integrated for effective library service delivery in Nigeria.
- 3).To examine the perceptions of librarians towards the use of innovative technologies in library service delivery in Nigeria.
- 4) To determine innovative technologies effectiveness in library service delivery in Nigeria.
- 5) To find out the challenges faced by librarians in integrating innovative technologies in libraries.

## Literature Review

### Awareness of Innovative Technologies by Librarians for Effective Service Delivery

We live in a society where most people access information through advanced technology rather than using the library, so librarians need to dance to the tune of this present generation by adopting technological innovations in their information service delivery in order to remain relevant. But the question is how many librarians are aware of the innovative technologies needed for effective library service delivery?

According to Ezeabasili (2021), awareness is the ability of people to realize or know that something truly exist, it is all about being cognizant, knowledgeable and informed of something. Integrating new technologies in the library services delivery will be super effective if librarian's awareness on these innovative technologies is enhanced; this will lead to a smooth library services delivery. Mondal (2021) opine that there is awareness that a lot of benefits are derived through the adoption and use of information technologies in libraries.

Manjunatha and Kumar (2020) discovered in their study that both male and female librarians are aware of smart technologies that aid in library services delivery. They are aware of web based technology (webopac technology), RFID technology and artificial intelligence technology (robots). In a study carried out by Saibakumo (2021), librarians' level of awareness about the following emerging technologies was very high: radio frequency identification (RFID), WEOPAC, artificial intelligence (AI), social media, D-space (institutional repository), library website, and internet of things. According to Saibakumo, librarians do not have much awareness on the following emerging technologies, Google partnered libraries, ready to code initiative, digital storytelling and 3D/2D digital printing.

Many libraries and information services already use artificial intelligence (AI) technologies in their operations (Alam,2022). AI is essential for the effectiveness and efficiency of library services delivery to users Subaveerapandiyan, Sunanthini and Amees, (2023) discovered in their studies that the library and information science professionals were aware of AI technologies in libraries and indicated that AI is essential for the effectiveness of and efficiency of library services delivery to users.

### **Innovative Technologies Integrated in Libraries**

Different technologies have been deployed by libraries to facilitate library services delivery. Technology helps to extend the reach of the library and its resources into the classroom and beyond (Hutchinson & Brumpton, 2023). Angadi (2021) listed a lot of innovative technologies for the library of the future as robots, big data, artificial intelligence, book chain, driverless cars. Angadi further stressed that there are massive technology developments that are ongoing and underway which can be great additions to the user's experience at the local library

Manjunatha and Kumar (2020) listed the smart technologies adopted in college of Engineering Karnataka library as Webopac, internet of things, RFID technology and artificial intelligence. Some of the innovative technologies which we can apply in advance library services are big data, artificial intelligence, block chain technology, internet of things, library mobile apps, driverless cars and drones (Mondal, 2021). Patil and Nalawade, (2018) opined that libraries of all kinds have the potential to provide a valuable service by allowing greater access to these ground breaking technologies; robots, library mobile apps, virtual reality app, 3D printers, book delivery drone, digital interface for printed books, e-reader apps, self service printing, photocopying and scanning solutions. The advancement in information technology towards

enhancing information access and dissemination has opened up a vista for the adoption of innovative technologies for the provision of effective library services to library users.

### **Perceptions of librarians towards the use of innovative technologies in library service delivery in Nigeria.**

The delivery of library services has been significantly impacted by the use of cutting-edge technologies worldwide. However, little is known about how Nigerian librarians feel about adopting and using these technologies. With a focus on recent research and publications, this literature review seeks to investigate the perceptions, convictions, and worries of Nigerian librarians regarding the application of cutting-edge technologies to the provision of library services. Due to the introduction of cutting-edge technologies in the delivery of library services in recent years, the field of librarianship has undergone a rapid transformation. The opinions of librarians regarding the adoption and integration of these technologies in Nigeria, however, are still largely unexplored. Examining Nigerian librarians' attitudes, beliefs, and concerns regarding the application of cutting-edge technologies to the provision of library services is the goal in this part of this research.

Still on the opinions of Nigerian librarians toward cutting-edge technologies, recent studies have shed light as according to Oyewusi et. al. (2021), Nigerian librarians generally have a positive attitude toward the use of technology and are aware of its potential to increase access to information, improve user experience, and streamline library operations. Innovative technologies were seen by them as tools for enhancing service effectiveness and remaining relevant in the digital era. Numerous studies have tried to determine how librarians view the use of innovative technologies in developing nations. Ogunlana and Idiegbe's study in 2019 showed that Nigerian librarians understood the value of technology and saw its potential to improve library services. It was discovered that librarians generally viewed the adoption of technology favorably, praising its capacity to enhance information access and knowledge sharing.

### **Innovative technologies effectiveness in library service delivery in Nigeria**

Globally, library services have changed as a result of the introduction of innovative technologies, which now provide improved information access, enhanced user experiences, and streamlined operations. Researchers have looked into how effective library service delivery in Nigeria is affected by new technologies. Studies by Efe, Isah, and Efe (2021) and Odedeji and Awoleye (2020), among others, have highlighted how the incorporation of technologies like digital libraries, self-checkout systems, and mobile applications has significantly improved information access and retrieval processes, making library services more effective and user-friendly.

Innovative technologies have shown the ability to expand the audience they can reach and increase accessibility in Nigerian libraries. Ademodi and Olaore (2019) discovered that the digitization of library collections and the availability of online resources have allowed users in remote areas to virtually access information, extending the reach of library services beyond physical locations. This accessibility has increased inclusion and democratized access to information. The overall user experience in Nigerian libraries has been greatly improved by the use of innovative technologies. According to research by Esew and Jibril (2020), the use of

virtual reality technology in Nigerian academic libraries for example, has changed the way that traditional learning environments are used, enticing users and encouraging active learning. Applications for virtual reality provide immersive experiences, allowing users to explore virtual worlds and engage with data in novel ways.

The automation and operational effectiveness of Nigerian libraries have both been enhanced by innovative technologies. An investigation by Ogunmodede et al. (2021) emphasized the value of automated book sorting devices, RFID technology, and library management systems in streamlining operations like cataloging, circulation, and inventory control. These time-saving technologies have also reduced human error, giving librarians more time to focus on user interaction and individualized services. These technologies have improved user experiences, operational effectiveness, and library outreach and accessibility. To fully utilize the potential of innovative technologies in Nigerian libraries, however, issues like funding and infrastructure constraints must be resolved.

### **Challenges to the Integration of Innovative Technologies in Libraries**

Many libraries in Nigeria face various problems in their attempt to adopt the use of innovative technologies to deliver efficient and effective library services. According to Mondal (2021), the following challenges need to be addressed for effective use of technologies in the libraries; limited financial resources, shortage of information and communication technologies (ICT) facilities and ICT skills, lack of policies and poor maintenance of ICT equipments. Mondal further stressed that most of the ICT equipments are not adequately maintained in most libraries as a result of maintenance cost which is usually very high.

Artificial intelligence (AI) is an innovative technology being adopted in libraries to create machines which can perform tasks that normally require human intelligence. In the words of Subaveerapandian, Sunanthini and Amees (2023), many challenges need to be addressed before AI can be fully integrated into libraries and information services. These challenges include; privacy, security and ethical considerations, lack of AI skills, budgetary constraints and high energy requirements.

In a study carried out by Dowdy (2020), results from the study showed that the barriers to the adoption of new technologies in libraries are; time to learn, access to technology, coworker complacency and administrative decisions. According to Shahzad and Iqbal (2020), negative attitude of library practitioners towards technology, poor information technology (IT) of librarians, lack of sufficient budget, inadequate IT infrastructure, lack of administrative support to adopt information technologies, lack of innovative leaders in librarianship, improper planning, non-availability of technical support, absence of IT policy, lack of training opportunities, and lack of innovative attitude of librarians to adopt information technology are the major obstacles in the way of the implementation of technologies in libraries.

### **Methodology**

The study adopted descriptive survey research design. The population of the study consist of all practicing librarians who are members of the Nigeria Library association (NLA) Google group official online platform for librarians in Nigeria. Out of which 118 librarians filled the online distributed questionnaires. The instrument for data collection was a structured online Google

forms questionnaire. The questionnaire consisted of six sections. Section one was on demographic information of the respondents, while section two to six elicited data from the respondents in line with the objectives that guided the study. The responses were based on a 4-point Likert scale, with scoring point ranging from 4 to 1 with a criterion mean of 2.50. The sample size of 118 respondents for the online data collection conducted through Google Forms was determined based on feasibility, access and time constraints. While this sample size may not be large enough to be considered fully representative, it can still provide valuable insights according to the research context and objectives.

The instrument was converted to an online survey using Google form, the online link was posted on the NLA platforms soliciting responses from practicing librarians who are members of the platform. After two weeks allocated for data collection, a reminder was sent to encourage maximum participation. After the three weeks allocated for data collection, the online survey was closed from accepting responses. The questionnaire was developed by reviewing relevant literature, consulting experts, and conducting pilot testing with a small sample size before assessing its internal consistency and reliability through measures such as Cronbach's alpha in a larger study population.

The survey response summary show that 118 practicing librarians participated in the study. The data were retrieved and analyzed using descriptive analysis of table, frequencies, percentages, mean ratings and standard deviation. Statistical package for social sciences (SPSS) software version 24.0 was used as tool for data analysis in research. In the research study, confidentiality and anonymity of the data were ensured through secure data storage and anonymized participant identifiers, while participation levels were measured and controlled using standardized survey response rates and participant tracking mechanisms.

## Results

This section is concerned with data presentation, analysis, interpretation and discussion of findings. The results are presented and analyzed based on the objectives that guided the study.

**Table 1: Frequencies and Percentages of responses on Librarians' awareness of innovative technologies for effective library service delivery in Nigeria N=118**

Items	Aware		Not Aware		Decision
	Freq	%	Freq	%	
1. Artificial Intelligence technology (e.g robots)	88	74.6	30	25.4	Aware
2. WebOPAC	58	49.2	60	50.8	Not Aware
3. D-space	68	57.6	50	42.4	Aware
4. Radio frequency identification (RFID)	48	40.7	70	59.3	Not Aware
5. Social media	106	89.8	12	10.2	Aware
6. Internet of things (IoT)	80	67.8	38	32.2	Aware
7. Google partnered libraries	30	25.4	88	74.6	Not Aware
8. Ready to code initiative	38	32.2	80	67.8	Not Aware

9. Digital storytelling	40	33.9	78	66.1	Not Aware
10. 3D/2D digital printing	14	11.9	104	88.1	Not Aware

Table 1 shows the frequencies and percentage responses on librarians' awareness of innovative technologies for effective library service delivery in Nigeria. The analysis indicates that out of the 10 listed innovative technologies for effective library service delivery in Nigeria, more than 50% of librarians are aware of four which include: Artificial Intelligence technology, D-space, Social media and Internet of things (IoT). Over 50% of librarians are not aware of the remaining six innovative technologies for effective library service delivery.

**Table 2: Frequencies and Percentages on innovative technologies integrated for effective library services in Nigerian libraries**

	YES		NO		Decision
	Freq	%	Freq	%	
1. Artificial Intelligence technology (e.g robots)	55	46.6	63	53.4	Agree
2. WebOPAC	46	39.0	72	61.0	Disagree
3. D-space	66	55.1	52	44.9	Agree
4. Radio frequency identification (RFID)	40	33.1	78	66.9	Disagree
5. Social media	100	83.9	18	16.1	Agree
6. Internet of things (IoT)	70	59.3	48	40.7	Agree
7. Google partnered libraries	28	22.9	90	77.1	Disagree
8. Ready to code initiative	30	24.6	88	75.4	Disagree
9. Digital storytelling	18	15.3	100	84.7	Disagree
10. 3D/2D digital printing	19	16.1	99	83.9	Disagree

As shown by the frequencies and percentages in the above table, out of the 10 listed items, more than 50% of librarians agree on four as innovative technologies integrated for effective library services in Nigerian libraries. They include: artificial intelligence technology, D-space, social media and internet of things. However, more than 50% of the respondents did not agree with the remaining six items as innovative technologies integrated for effective library services in Nigerian libraries.

**Table 3: Mean ratings on the perceptions of librarians towards the integration of innovative technologies in library service delivery in Nigeria**

	Mean	SD	Remark
1. Librarians consider innovative technologies as valuable tools that can improve user satisfaction and engagement	3.73	.48	Agree
2. Librarians are open to adopting and integrating innovative technologies in their daily work routines	3.58	.53	Agree
3. Innovative technologies have the potential to enhance the quality of library services provided by librarians	3.68	.50	Agree

4. Librarians feel adequately supported by their organizations in adopting and implementing innovative technologies	3.71	.45	Agree
5. Librarians perceive innovative technologies as essential for keeping up with the changing information and technology landscape	3.59	.56	Agree
6. Librarians believe that incorporating innovative technologies can provide more efficient and effective access to library resources	3.68	.50	Agree

Respondents' mean ratings in Table 3 show they have positive perception regarding the six listed items on integration of innovative technologies in library service delivery in Nigeria. Their mean ratings for the six items ranged from 3.58 to 3.73

**Table 4: Mean ratings on the effectiveness of innovative technologies in library service delivery in Nigeria?**

	Mean	SD	Remark
1. Innovative technologies have increased library outreach and engagement.	3.36	.69	Agree
2. Innovative technologies have improved the accessibility and availability of library resources for users.	3.53	.57	Agree
3. Innovative technologies have enhanced the efficiency and speed of information retrieval processes in libraries	3.44	.50	Agree
4. Innovative technologies have contributed to a more personalized and customized library experience for users.	3.41	.59	Agree
5. Innovative technologies have facilitated better collaboration and knowledge-sharing among library staff.	3.56	.56	Agree
6. Innovative technologies have improved the overall user satisfaction and experience in library services.	3.49	.54	Agree

As displayed in Table 4, the mean ratings of the respondents indicates that they agree to the six listed items as ways through which innovative technologies are effective in library service delivery in Nigeria. The mean ratings for the six items ranged from 3.36 to 3.56.

**Table 5: Mean ratings of the challenges to the integration of innovative technologies for effective library services delivery in Nigeria**

	Mean	SD	Remark
1. Negative attitude of library practitioners towards innovative technology	3.24	.77	Agree
2. Lack of sufficient budget	3.58	.62	Agree

3. Lack of administrative support to adopt innovative technologies	3.56	.65	Agree
4. Inadequate IT infrastructure	3.64	.58	Agree
5. Poor information technology (IT) skill of librarians	3.32	.65	Agree
6. Lack of innovative leaders in librarianship	3.29	.74	Agree
7. Non-availability of technical support	3.36	.58	Agree
8. Lack of training opportunities for librarians	3.31	.67	Agree
9. Absence of IT policy	3.31	.70	Agree
10. Lack of innovative attitude of librarians to adopt information technology	3.41	.64	Agree

Table 5 shows that the respondents agree to all the 10 items in the table as the challenges to the integration of innovative technologies for effective library services delivery in Nigeria. They include: Negative attitude of library practitioners towards innovative technology, Lack of sufficient budget, Lack of administrative support to adopt innovative technologies, Inadequate IT infrastructure, Poor information technology (IT) skill of librarians, Lack of innovative leaders in librarianship, Non-availability of technical support, Lack of training opportunities for librarians, Absence of IT policy and Lack of innovative attitude of librarians to adopt information technology. The mean ratings for the 10 challenges ranged from 3.24 to 3.64.

## Discussion of findings

The study was limited to a small sample size in Nigeria, which may not be representative of the entire country's library landscape. Additionally, the reliance on self-reported data from library staff could introduce potential biases, affecting the reliability of the findings. The findings of this study provide practical insights for library administrators in Nigeria on the effective integration of innovative technologies to enhance service delivery. Theoretically, the study contributes to the understanding of the factors that influence the successful implementation of technology-driven library services in developing country contexts, which can inform future research and policy interventions.

The study's findings can serve as a valuable resource for future field researchers investigating the integration of innovative technologies in library service delivery in Nigeria or similar developing country settings. The insights gained can guide the design of more comprehensive studies, explore additional variables, and assess the long-term impact of technology integration on library patrons' experiences and overall organizational performance. The findings of this study both support and challenge previous research on the integration of innovative technologies in library service delivery. While the study confirms the potential benefits of technology integration, such as improved efficiency and user satisfaction, it also highlights the unique challenges faced by Nigerian libraries, such as infrastructure limitations and digital literacy barriers, which may not have been as prominent in studies conducted in more

developed contexts. These differences underscore the importance of tailoring technology integration strategies to the specific needs and constraints of the local environment, with implications for the transferability of best practices across diverse settings.

The result obtained for objective number one, table 1, revealed that librarians are aware of Artificial intelligence technology (AI), D-space, Social media and Internet of things (IoT). The findings are in line with that of Manjunatha and Kumar (2020) who discovered in their study that both male and female librarians are aware of smart technologies that aid in library services delivery. On the contrary, the librarians are not aware of WebOPAC, Radio Frequency Identification (RFID), Google partnered libraries, Ready to code initiative, Digital storytelling and 3D/2D digital printing and this is in line with the findings of Saibakumo (2021) that librarians do not have much awareness on the following emerging technologies, Google partnered libraries, ready to code initiative, digital storytelling and 3D/2D digital printing. From the findings, librarians in Nigeria are aware of just few of the innovative technologies that aids in effective library services delivery. This is not encouraging at all, especially now that librarians are struggling to remain relevant, they are supposed to be aware of the technologies that can help their services stand out among their competitors.

The findings in table 2 showed that libraries in Nigeria have integrated AI technologies, D-space, Social media and internet of things in their service delivery, the findings is partially in line with that of Angadi (2021) that there are massive technology developments that are ongoing and underway which can be great additions to the user's experience at the local library. From the findings, libraries in Nigeria have integrated only the basics of the innovative technologies. On the other hand, they have not integrated WebOPAC, Radio Frequency Identification (RFID), Google partnered libraries, Ready to code initiative, Digital storytelling and 3D/2D digital printing, the findings contradicts that of Manjunatha and Kumar (2020) who listed the smart technologies adopted in college of Engineering Karnataka library as Webopac, internet of things, RFID technology and artificial intelligence. When compared with libraries in other countries, it is obvious that libraries in Nigeria still have a long way to go in the integration of innovative technologies in their services delivery.

Objective 3 (table 3) is on perceptions of librarians towards the use of innovative technology use in libraries. Their mean ratings for the six items ranged from 3.58 to 3.73 signifying admirable perceptions. Numerous studies have highlighted that librarians recognize the value of innovative technologies in improving access to information, enhancing the user experience, and facilitating information literacy (Phan, Shokrollahpour & Jarrahi, 2020). Research has shown that librarians are generally receptive to adopting and integrating new technologies into their daily work. They acknowledge the potential benefits of technologies in streamlining processes, expanding resources, and engaging library users (Khuong & Lam, 2020). There is a consensus among librarians that innovative technologies can improve the quality and effectiveness of library services. They believe that technologies enable efficient information retrieval, facilitate collaboration, and support personalized user experiences (Roknuzzaman, 2019). Adequate support, including training and resources, is crucial for librarians to effectively provide and utilize innovative technologies. Organizations that offer comprehensive support and professional development opportunities tend to foster a positive environment for technology integration in libraries (Saracevic, 2019). With the evolving information landscape,

librarians recognize the importance of embracing and adapting to new technologies as they understand that innovative technologies are key to meeting the changing needs of library users and staying relevant in a digital age (Chowdhury, 2019).

Findings to objective 4 in table 4 which is on effectiveness of using innovative technologies in library service delivery indicated positive responses from librarians as the mean ratings for the six items ranged from 3.36 to 3.56. According to Liu & Lou (2020), the use of innovative technologies, such as social media platforms and virtual programs, has been found to increase library outreach and engagement with the community. Innovative technologies have contributed to improved accessibility and availability of library resources through online catalog systems, digital repositories, and electronic resources (Bonnici, Borg & Vella, 2020). Innovative technologies like advanced search engines and integrated library systems have improved the efficiency and speed of information retrieval within libraries (Wang & Wu, 2021). The implementation of collaborative tools and project management software has been found to enhance collaboration and knowledge sharing among library staff (Corrado & Moulaison, 2020). Innovative technologies have enabled libraries to provide personalized experiences to users through features like customization and mobile apps (Saarti, et al. (2021).

From the findings in table 5, librarians are faced with the following challenges in their quest to introduce innovative technologies in libraries; Negative attitude of library practitioners towards innovative technology Lack of sufficient budget, Lack of administrative support to adopt innovative technologies, Inadequate IT infrastructure, Poor information technology (IT) skill of librarians, Lack of innovative leaders in librarianship, Non-availability of technical support, Lack of training opportunities for librarians, Absence of IT policy, Lack of innovative attitude of librarians to adopt information technology. The challenges are not different from what authors from other countries have discovered. Like the study of Mondal (2021), he opine that the following challenges needs to be addressed for effective use of technologies in the libraries; limited financial resources, shortage of information and communication technologies (ICT) facilities and ICT skills, lack of policies and poor maintenance of ICT equipments. Subaveerapandian, Sunanthini and Amees (2023), in their own studies discovered that many challenges need to be addressed before AI can be fully integrated into libraries and information services. These challenges include; privacy, security and ethical considerations, lack of AI skills, budgetary constraints and high energy requirements. From the findings of Dowdy (2020), results from the study showed that the barriers to the adoption of new technologies in libraries are; time to learn, access to technology, coworker complacency and administrative decisions. According to Shahzad and Iqbal (2020), negative attitude of library practitioners towards technology, poor information technology (IT) of librarians, lack of sufficient budget, inadequate IT infrastructure, lack of administrative support to adopt information technologies, lack of innovative leaders in librarianship, improper planning, non-availability of technical support, absence of IT policy, lack of training opportunities, and lack of innovative attitude of librarians to adopt information technology. The above challenges need to be dealt with for proper integration of innovative technologies in libraries.

## Conclusion

This research has provided important insights into the integration of innovative technologies for improving library service delivery in Nigeria. The findings indicate that while Nigerian libraries

are beginning to adopt new digital technologies, there are still significant barriers and challenges that have hindered more widespread and effective implementation. The research has helped to fill an existing knowledge gap by providing in-depth empirical data on the current state of technology usage in Nigerian libraries, the key drivers and inhibitors, and the perceptions and experiences of both librarians and library users. By addressing the research questions, the study has shed light on the specific technologies being utilized, the benefits realized, the training and infrastructure needs, and the cultural and organizational factors impacting technology adoption.

A key limitation of the research is the relatively small sample size, which while providing rich quantitative data, may not be fully representative of the diverse library landscape across Nigeria. Additionally, the research was focused on the perspectives of librarians, and future studies should also seek to capture more insights from library users to fully understand the impact on service delivery from their standpoint. The findings from this research carry important implications for library practitioners, policymakers, and future researchers in this field. For practitioners, the insights can inform strategic technology planning and investment, as well as guide efforts to upskill librarians and enhance user experiences. Policymakers should consider the research findings when developing frameworks and initiatives to drive digital transformation of public services, including libraries.

Further research is needed to build on these initial findings and explore the integration of emerging technologies such as artificial intelligence, augmented reality, and the Internet of Things within library settings. Comparative studies across different regions of Nigeria, as well as between urban and rural libraries, would also provide valuable additional perspectives. Overall, this research has revealed both the progress being made as well as the significant work still needed to fully harness the potential of innovative technologies to enhance library service delivery in Nigeria. The insights generated can inform practical strategies and policies to overcome the existing barriers and inequities, ultimately enabling libraries to better serve the diverse information needs of citizens.

## References:

Ademodi, F., & Olaore, B. (2019). Digitization and accessibility of library resources in Nigeria. *Journal of Library Administration and Management (JLAM)*, 3(1), 73-87.

Adewole, K. S., & Oreyomi, M. O. (2021). Transforming Library Services in the University System: The Role of Information Communication Technology in Nigeria. *Journal of Academic Librarianship and Scientific Research*, 5(1), 18-30.

Adewumi, A. O. (2021). Paradigm Shift in Library Operations: An Assessment of Libraries in Nigeria. *Library Philosophy and Practice*, 2021(1), 13.

Alam, A. (2022). Employing adaptive learning and tutoring robots for virtual classrooms and smart campuses: reforming education in the age of artificial intelligence. *LNEE* 9(14).

Angadi, S.S. (2021). Innovative technologies for the library of the future. *International journal of educational technology* 3(40 37-41

Anunobi, C. O., & Egbom, C. G. (2020). The Development of Mobile Library Applications: A Case Study of Nigerian Libraries. *Library Hi Tech News*, 37(6), 28-35.

Bonnici, L., Borg, C., & Vella, R. (2020). Electronic resources and the library: Using classification to drive accessibility. *Journal of Librarianship and Information Science*, 52(1), 107-121.

Chowdhury, G. G. (2019). Digital libraries and innovation. *Journal of Documentation*, 75(3), 529- 530.

Corrado, E. M., & Moulaison, H. L. (2020). Collaboration in libraries: Creating synergy for innovation. *Libraries Unlimited*.

Dowd, A.E. (2020). Public librarian's adoption of technology in two southeastern states. *MIS Quarterly* 27(3)

Efe, G. S., Isah, E., & Efe, S. (2021). Digital libraries and information service delivery: A survey of academic libraries in Nigeria. *Electronic Journal of Academic and Special Librarianship*, 22(1), 1-18.

Esew, U. Z., & Jibril, Y. T. (2020). Enhancing student learning experience through virtual reality in Nigerian academic libraries. *African Journal of Library, Archives & Information Science*, 30(1), 67-81.

Ezeabsili, A.C. (2021). Health information needs awareness, utilization and risk health behaviours of pregnant women in Anambra state. PhD dissertation submitted to the department of library and information science, Abia state university, Uturu.

Idhalama, O.U., Igbinovia, M.O., & Ezeabasili, C.A. (2021). Use of webinar tools for teaching and learning by library and information professionals in Nigeria. *Information Development*. 37(3) 334-344 Accessible via: <https://journals.sagepub.com/doi/10.1177/02666669211003923>

Hutchinson, E. & Brumton, C. (2023). Technology and the school library: ideas for projects and teaching. *Head teacher Update*. Retrieved August 20, 2023 from [www.headteacher.update.com](http://www.headteacher.update.com)

Khuong, N. V., & Lam, L. T. (2020). Sidestepping challenges, libraries thrive in the digital landscape: A case study of a Vietnamese public library. *Library Hi Tech*, 38(4), 812-826.

Liu, S., & Lou, S. (2020). Examining the impact of social media on public library outreach: case study of Facebook in two U.S. public libraries. *Public Library Quarterly*, 39(4), 478-495.

Manjunatha, K. & Kumar, P. (2020). A study on awareness and adoption of smart technologies in libraries of engineering colleges in Karnataka. *Indian journal of library science and information technology* 5(2), 68-73

Mondal, H. (2021). Emerging trends and innovative technologies for the library of the future. Conference paper presented at UGC, CPE funded national seminar on prospects of library services in e-learning ecosystem, organized by Barrackpore surrendranath college.

Odedeji, F. A., & Awoleye, F. (2020). Adoption of mobile library applications in Nigerian academic libraries. *Collection Building*, 39(1), 2-12.

Ogunlana, B., & Idiegbeyan-ose, J. (2019). Librarians' perception of the impact of ICT skills on library services in Nigeria. *Library Philosophy and Practice*, 1-11.

Ogunmodede, T., Idiegbeyan-ose, J., & Ajediran, I. (2021). Library management systems in Nigerian libraries: Stakeholders' perspectives. *New Library World*, 122(1/2), 51-70.

Ojo, T. S. (2021). The Adoption and Perception of Cloud Computing among University Libraries in Nigeria. *OCLC Systems & Services: International Digital Library Perspectives*, 37(1), 40-54.

Oyewusi, F. O., Aina, M. Y., Olatokun, W. M., Aboyade, F., & Ibikunle, F. (2021). Perception of librarians towards digital transformation in Nigerian university libraries. *Malaysian Journal of Library & Information Science*, 26(2), 23-41.

Patil, R.M. & Nalawade, R.K. (2018). Innovative technologies to implement at the library of the future. *International journal of advanced research, ideas and innovations in technology* 4(2), 1249-1251

Roknuzzaman, M. (2019). E-learning and libraries: A case study on innovative service development in Bangladesh. In Proceedings of the 3rd International Conference on Information Science and Systems (ICISS 2019) (pp. 1-6). IEEE.

Saarti, J., et al. (2021). User Experience of a Personalised Library Discovery Tool. *Information Research: An International Electronic Journal*, 26(2), paper 901.

Saibakuma, W.T. (2021). Awareness and acceptance of emerging technologies for extended information service delivery in academic libraries in Nigeria. *Library Philosophy and practice (e-journal)*, <https://digitalcommons.unl.edu/libphilpra/5266>

Salami, A., & Agboola, O. O. (2021). Data Analytics in Nigerian Academic Libraries: Jurisprudence, Current Practise and Future Development. *DESIDOC Journal of Library & Information Technology*, 41(1), 25-31

Saracevic, T. (2019). Journal of the Association for Information Science and Technology, 70(5), 513-516.

Shahzad, K. & Iqbal, A. (2020). Barriers faced by library professionals for technology adoption In University libraries of Lahore, Pakistan. *Library Philosophy and practice (e-journal)*, University of Nebraska-Lincoln

Subaveerapandian, A., Sunanthini, C. & Amees, M. (2023). A study on the knowledge and perception of artificial intelligence. *IFLA journal* 49(1)

Wang, C., & Wu, D. (2021). Study on the influence of discovery service on the traditional services of the library: Empirical analysis based on the E-Triangle model. *IFLA Journal*, 47(1), 17-30.