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IMPROVING INNOVATIVE TOOLS FOR DISSEMINATION OF INFORMATION IN ACADEMIC LIBRARIES IN NIGERIA

By

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Abstract

This study focused on improving innovative tools for information dissemination in Nigerian academic libraries. It aimed to identify the types and extent of technology used, challenges faced, and strategies for leveraging innovative technologies. A survey was conducted among 107 members of the Academic and Research Librarians Section of the Nigeria Library Association. The findings revealed that open access repositories and library automation software (e.g., Koha and Greenstone) were widely used (67.6%). Integrated collaborative tools like Google Workspace and Microsoft 365 were also valued for enhancing real-time collaboration (mean score: 4.9). However, limited financial resources (88.7%) and budget constraints hindered the adoption of innovative technologies. To address these challenges, ongoing learning, training, and professional development for librarians were recommended (90.5%). Despite the availability of various technologies, the adoption of emerging technologies is slow, highlighting the need for strategic intervention. The conclusion was drawn that the study concludes that academic librarians should prioritize continuous learning, training, and collaboration with technology companies to harness the potential of innovative technologies for effective information dissemination. Conclusion was drawn that Nigerian university research benefits from libraries but needs to adopt emerging digital tools tailored to researchers' needs. Strategic efforts are essential to enhance technology use and boost productivity. By doing so, librarians can enhance their services and support the information needs of students and researchers. Recommendations were made that Nigerian academic libraries must adopt innovative technologies, invest in training and collaboration, to improve information sharing and user engagement effectively.

Keywords: *Innovative Technologies; Information Dissemination; Academic Librarians, Nigeria*

Introduction

Academic libraries play a crucial role in disseminating information, serving as gateways to extensive knowledge resources. With the advent of emerging technologies, the methods by which libraries organize, manage, retrieve, and share information have undergone significant transformation. Modern tools such as social media platforms, user-friendly websites, mobile applications, online catalog systems, Electronic Theses and Dissertations (ETD) platforms, and digital repositories have revolutionized access to information, making it more convenient, efficient, and engaging for users. By adopting these innovative technologies, libraries can transcend physical limitations, enabling users to access information anytime and anywhere. This technological shift accelerates resource discovery and retrieval, boosts user engagement, and fosters more

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effective information sharing. For academic libraries, it is essential for staff to stay informed about these technological advancements, which underscores the importance of ongoing staff training and user support to maximise the benefits of these innovations.

The exploration of new technology in academic libraries has become increasingly popular, especially when it comes to providing research support services. Today's academic library isn't just a place to store information; it's a hub for fostering knowledge development, sharing, and application. Research by Moruf and Dangani (2020) highlights that academic librarians are focusing on research-centered services like organising and retrieving information, managing data, and offering other services that can enhance the quality of research output in academic settings. Ultimately, the ability of academic libraries to fulfil their mission of helping researchers effectively, to use available information resources to generate new knowledge hinges on the overall skills and expertise of librarians.

The emergence of new technologies and the increasing ability to access information remotely have raised significant questions about the evolving role of library services within the research process. In Nigeria, academic librarians play a vital role in enhancing research productivity by providing comprehensive and effective library and information services. To remain relevant in the digital age, libraries must adapt to the changing landscape of information needs. Users now seek seamless and convenient access to a diverse array of digital resources, including electronic books, online databases, and multimedia content. Consequently, libraries are required to invest in digital platforms and resources that can effectively meet these expectations. Furthermore, it is essential for libraries to ensure that their online resources are compatible across various devices, facilitating easy access anytime and anywhere (Saibakumo, 2021). This adaptation not only supports efficient research but also promotes broader access and engagement with information in the modern era.

Research by Moruf and Dangani (2020) underscores the pivotal role of emerging technologies in transforming information dissemination within libraries. They highlight tools such as bibliographic citation management software like Mendeley and library automation systems like Koha, alongside innovative solutions like QR codes and artificial intelligence. Similarly, Owolabi et al. (2022) identify ambient intelligence and data mining as promising advancements that enhance librarian efficiency and better serve user needs. These studies collectively demonstrate that a wide array of emerging technologies are highly relevant to the evolving demands of librarianship. They also emphasize the rapid pace of technological development, presenting libraries with critical opportunities to select and adopt tools that align with their service goals. In the context of the twenty-first century, it is vital for academic libraries to strategically integrate accessible, innovative technologies to elevate research capabilities and improve information management. Embracing these advancements empowers libraries to better support scholars and students, ensuring they remain vital hubs of knowledge and innovation.

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Statement to the Problem

Exploring Innovative Technologies for the Enhancement of Information Dissemination by Academic Librarians in Nigeria" highlights a critical research gap concerning the identification and implementation of the most effective technologies for information sharing within Nigerian academic libraries. This gap underscores the urgent need to investigate which emerging tools and solutions can best address the unique challenges faced by these institutions. Despite the potential benefits of innovative technologies—such as AI, ambient intelligence, and data mining—there are significant barriers to adoption in Nigeria, including limited funding for acquiring and maintaining new tools, as well as inadequate training for library staff to utilize these technologies effectively (Moruf and Dangani, 2020). Recognising this gap is essential for guiding future research and policy to ensure that Nigerian academic libraries can leverage technological advancements to improve information dissemination, ultimately enhancing their role in supporting academic and research activities.

Although modern technologies offer significant potential to transform information dissemination, academic libraries in Nigeria encounter numerous challenges in fully adopting and integrating these tools. Both librarians and users often lack comprehensive awareness of current advancements in information management and distribution, which hampers effective implementation (Omeluzor, Ugochi, & Iuakolam, 2020). The persistent gap between traditional library practices and emerging technological innovations creates barriers to efficient information organisation and sharing. Furthermore, infrastructural limitations and the absence of well-defined strategies for technology deployment exacerbate these difficulties. Addressing these issues is crucial for Nigerian academic libraries to play a more proactive role in information dissemination in the digital age. Consequently, researchers are motivated to explore how Nigerian academic librarians are leveraging innovative tools and strategies to enhance information dissemination, aiming to bridge the gap and foster more effective library services nationwide.

Research Objectives

1. To identify the innovative technologies that academic librarians in Nigeria are using to improve how information is shared.
2. To identify the extent of exploring innovative technologies for the enhancement of information dissemination by academic librarians in Nigeria.
3. To identify technological challenges faced by academic librarians in adopting and implementing innovative technologies for the enhancement of information dissemination in Nigerian libraries.
4. To identify strategies used by academic librarians in exploring innovative technologies for the enhancement of information dissemination.

Review of Literature

Many professionals are enthusiastic about embracing new technologies that can significantly enhance the functionality of academic libraries. These innovations not only facilitate easier and more efficient access to information for users but also accelerate the delivery process, minimizing delays and improving overall delivery service. Research by Omeluzor, Ugochi, and Iuakolam (2020) underscores the critical

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need to equip library professionals with innovative technological skills, ensuring they can provide timely and effective services to their patrons. The integration of advanced technologies has fundamentally transformed library operations, reshaping the resources available and elevating the quality of user experiences. This technological evolution is pivotal in redefining the role of libraries in the modern information landscape.

Types of innovative technologies used for the enhancement of information dissemination by academic librarians.

Various technologies play unique roles in enhancing information dissemination and accessibility within libraries. Innovation involves exploring new methods to improve existing services, and multiple platforms facilitate this. These include collaboration tools, library websites, digital catalogues, blockchain technology, teleconferencing, and online training sessions. According to Bhoi (2017), social media channels like Facebook, Twitter, blogs, WhatsApp, and Telegram have become essential for rapid information sharing in libraries, particularly in promoting electronic resources. Such technologies dramatically influence how information is shared and accessed, leading to enhanced user benefits. Technology-driven services have transformed library operations, allowing for remote access, a broader reach to diverse resources, collaborative tools, and improved sharing of electronic theses and dissertations (Otolo, 2020).

Research by Okeke and Asifor (2023) indicates that diverse social media tools foster collaboration and interaction between library users and professionals, thereby improving knowledge sharing. Negi and Sani (2023) emphasize that innovative tools like library websites, online catalogs, and digital repositories enhance accessibility and user experience, facilitating effective resource discovery and promoting engagement. The study identifies a range of innovative technologies that academic libraries in Nigeria can adopt to enhance information dissemination, including integrated library systems, open access repositories, library automation software, learning management systems like Google Classroom and Moodle, and cloud computing. The researchers aim to explore how academic librarians utilize these tools to improve information dissemination, underscoring the importance of technology in modern library services.

The extent of exploring dissemination by academic librarians

Leveraging technology in digital libraries is crucial for enhancing how patrons' access, retrieve, and utilise information. For librarians, these technologies are not merely tools but essential components that improve operations and add significant value to their professional roles. Exploring innovative technologies can greatly enhance the sharing, retrieval, and use of information. The digital landscape offers various technologies, including robots, 3D printing, and virtual reality applications, which aid professionals in their work.

Amuda and Onanuga (2023) emphasise that modern integrated library systems have greatly improved resource management, cataloging, and acquisitions, leading to enhanced operational efficiency and more effective information sharing. Open access repositories facilitate broader dissemination of research outputs, while integrating library resources into Learning Management Systems (LMS) such as Moodle or Canvas allows students and faculty to access materials more conveniently. Additionally,

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professional development and coaching within libraries play a crucial role in enhancing users' information literacy skills, guiding them in resource navigation. Moruf and Dangani (2020) advocate for the adoption of immersive technologies, recommending online training webinars to help both librarians and users maximize these tools. They highlight innovations like virtual tours and augmented reality features, which can enrich the learning experience and foster more engaging interactions with library resources.

Ezinwanyi and Kikelomo (2023) emphasize that innovations in libraries introduce new tools that enhance service delivery and user experiences, allowing libraries to meet user needs more effectively. Furthermore, technologies such as Radio Frequency Identification (RFID), Closed-Circuit Television (CCTV), and blockchain improve management efficiency and security. These advancements allow librarians to operate effectively in hybrid environments. The increased role of Information and Communication Technology (ICT) in libraries facilitates service delivery, making them vital hubs for knowledge and support. Academic libraries play a crucial role in guiding users and fostering student success in their educational and research pursuits. Overall, the integration of innovative technologies is transforming library services, making them essential resources for academic achievement.

Challenges that Academic Librarians Encountered in Adopting and Implementing Innovative Technologies for Enhancement of Information Dissemination

Librarians encounter numerous challenges in adopting modern technology to enhance service delivery. Addressing these obstacles is crucial; otherwise, they can lead to disparities and disrupt essential librarian functions. Shehu (2020) noted that many library professionals, particularly in Nigerian libraries, struggle with basic computer skills and the adoption of innovative technologies due to insufficient training and support. Concerns about security and privacy further complicate their ability to implement these technologies effectively. Bichi (2021) highlighted the necessity for librarians to acquire new skills to leverage modern tools for libraries and information services, suggesting that overcoming these challenges can ultimately enhance the profession.

According to Awuor, Rabah, and Maake (2013), libraries face several hurdles in rolling out new ICT-related technologies, which can impede the dissemination of knowledge to broader audiences. Limited financial resources, including tight budgets and the costs of installation and maintenance, significantly contribute to these challenges. Additionally, some librarians exhibit hesitance toward embracing technology, compounded by issues such as unreliable Internet access and outdated equipment. Sahabi and Otobo (2021) pointed out that a lack of essential skills can be a significant barrier, further exacerbated by insufficient training, skill gaps, resistance to new technology, and inadequate technological support, including a shortage of IT staff and technical assistance. Addressing these issues is essential for libraries to thrive in the digital age.

Strategies used by Academic Librarians in Exploring Innovative Technologies for the Enhancement of Information Dissemination

The evolution of communication and information sharing is significantly

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impacting academic libraries, as students increasingly rely on online resources. Aina, Ogundipe, and Adebowale (2010) stress the importance of investing in staff training and ongoing education to equip librarians with necessary skills for delivering comprehensive services in a tech-driven environment. Proficiency in web technologies is crucial, along with fostering confidence among librarians in their roles. The lockdown compelled library patrons to seek alternative ways to access information, prompting libraries to innovate in delivering services remotely.

Nworie, et al (2023) highlight the necessity of integrating innovative technologies—such as open access repositories, digital libraries, RFID systems, and mobile applications—to enable librarians and information professionals to fulfil their responsibilities effectively. Essential improvements include addressing training needs, updating library equipment and software, and implementing security measures like CCTV. Shehu (2020) discusses strategies libraries can adopt to leverage technology more effectively, emphasising the importance of cultivating a culture of continuous learning and professional development. Librarians should stay up to date with the latest technologies by participating in workshops, conferences, and webinars related to library science and information technology. By embracing these approaches, academic libraries can enhance their services and better meet the evolving needs of their users.

Methodology

For this study, the researcher used a survey research method, focusing on a group of 534 members from the Academic and Research Librarians Section of the Nigeria Library Association (ARLSNLA) WhatsApp group as of February 2024. The researcher applied a random sampling technique, selecting 107 respondents from the 137 expected responses. According to Adams (2020), when dealing with a continuous data population of over 500, a sample size of 137 is appropriate at a 90% confidence level. The researcher collected data through a questionnaire using Google Forms shared within the WhatsApp group over a span of three weeks. The analysis of the data gathered involved calculating frequencies, percentages, and mean scores.

Analysis and Discussions

To find out what innovative technologies are being used to enhance information sharing in libraries, we asked participants to select from a list of available options. The results of their choices can be seen in Table 1.

Table 1: Type of Innovative Technologies used for the enhancement of Information Dissemination in Libraries.

Innovative technologies	F	%
Integrated Library Systems (ILS)	60	56.6
Open Access Repositories & Library automation software's	72	67.9
Learning Management Systems (LMS) and classroom management software such as Moodle, Google Classroom, Canva	39	36.8
Digital Libraries and cloud computing	69	65.1
RFID Technology	15	14.2
Mobile Applications like Quick Response (QR) barcode technology	47	44.3
Data Analytics	16	15.1
Virtual Reality (VR) & Augmented Reality (AR)	6	5.7
Collaborative Tools	23	21.7

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Social Media and Online Communities	64	60.4
Artificial Intelligence (AI) for Recommender Systems and Robotics	14	13.2
Blockchain for Authentication and Security	7	6.6
Electronic Theses and Dissertations (ETD) Platforms	42	39.6
Online Webinars and Training Programs	39	36.8
Accessibility Features	23	21.7

Table 1 indicates that the most widely adopted innovative technologies in libraries are open access repositories and library automation software, used by 72 respondents (67.9%), followed by digital libraries and cloud computing with 69 respondents (65.1%), and social media and online communities with 64 respondents (60.4%). Integrated Library Systems (ILS) are also commonly used, with 60 respondents (56.6%), along with online webinars and training programs, adopted by 39 respondents (36.8%), and electronic theses and dissertations platforms, used by 42 respondents (39.6%). Mobile applications utilising QR code technology are employed by 47 respondents (44.3%), while accessibility features are implemented by 23 respondents (21.7%). Conversely, technologies such as RFID technology, data analytics, artificial intelligence, and blockchain have lower adoption rates, with F-values of 15 (14.2%), 16 (15.1%), 14 (13.2%), and 7 (6.6%) respectively, and virtual reality and augmented reality are the least used, with only 6 respondents (5.7%). Overall, the data suggests that libraries are focusing more on digital access, open resources, and social media engagement, while emerging technologies like RFID, AI, and VR are still less widely adopted.

Table 2: Extent of exploring innovative technologies for enhancing information dissemination by academic librarians

Items	High extent (F)	Extent (F)	low extent (F)	Very Low extent (F)	Undecided (F)	Mean score	Total
Modern Integrated Library Systems (ILS) software helps in managing library resources, cataloguing, circulation, and acquisitions has streamline library operations and make information dissemination more efficient	36 (33.6%)	49 (45.8%)		4 (3.7%)	4 (3.7%)	4.3	107
Open access repositories in libraries make research outputs, theses, and dissertations accessible to a wider audience	36 (33.6%)	56 (52.3%)	10 (9.3%)	2 (1.9%)	4.5	107	
Learning Management Systems (LMS) platforms like Moodle or Canvas ensure that students and faculty can access library materials directly from their course environments.	26 (24.3%)	58 (54.2%)	15 (14.0%)	5 (4.7%)	3 (2.8%)	4.1	107
Developing digital libraries provide access to e-books, academic journals, and multimedia resources. Platforms like LibGuides or Greenstone can be customised to create digital libraries.	37 (34.6%)	52 (48.6%)	13 (12.1%)	2 (1.9%)	3 (2.8%)	4.4	107
							107

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Radio Frequency Identification (RFID) technology such as RFID tags on books can simplify the check-in and check-out processes, while also helping with inventory management in the library	20 (18.7%)	42 (39.3%)	31 (29.0%)	8 (7.5%)	6 (5.6%)	3.9	
Mobile apps in the library have allow dissemination of library resources, search catalogues, and even check the availability of books in real-time	20 (18.7%)	47 (43.9%)	16 (15.0%)	7 (6.5%)	17 (15.9%)	3.8	107
Data analytics tools analyse user behaviour, popular resources, and other patterns in the library guiding the collection development, resource allocation, and service improvements	25 (23.4%)	42 (39.9%)	27 (25.2%)	7 (6.5%)	6 (0.0%)	3.9	107
Virtual Reality (VR) and Augmented Reality (AR) technologies create immersive learning experiences within the library. virtual tours, interactive exhibits, or augmented reality overlays on physical books	22 (20.6%)	44 (41.1%)	27 (25.2%)	10 (9.3%)	4 (3.7%)	3.8	107
Collaborative tools like Google Workspace or Microsoft 365 facilitate real-time collaboration among students and researchers in the library enhance information sharing and group projects	30 (28.0%)	49 (45.8%)	14 (13.1%)	7 (6.5%)	7 (6.5%)	4.9	107
Utilising social media platforms and online communities to engage with library users, sharing updates, host virtual events, and create discussion forums to foster a sense of community among users	39 (36.4%)	44 (41.1%)	15 (14.0%)	4 (3.7%)	5 (4.7%)	4.1	107
Implementing Artificial Intelligence (AI) for Recommender Systems to suggest relevant resources based on user preferences and past interactions significantly improve the user experience	26 (24.3%)	39 (36.4%)	24 (22.4%)	10 (9.3%)	8 (7.5%)	3.7	107
Exploring blockchain technology for enhancing authentication and security of digital resources helps in ensuring the integrity of academic materials and preventing unauthorised access in libraries	17 (15.9%)	41 (38.3%)	29 (27.1%)	12 (11.2%)	8 (7.5%)	3.6	107
Implement Electronic Theses and Dissertations (ETD) Platforms in libraries to manage and disseminate electronic theses and dissertations can simplify the submission process and increase the visibility of academic research	33 (30.8%)	41 (38.3%)	21 (19.6%)	4 (3.7%)	8 (7.5%)	3.9	107
Organising online webinars and training programs to educate	38 (35.5%)	41 (38.3%)	20 (18.7%)	2 (1.9%)	6 (5.6%)	4.1	107

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librarians and library users on the effective use of these technologies by ensuring that everyone is well-equipped to 3leverage the available resources							
Accessibility Features Ensure that all technologies implemented have built-in accessibility features to cater to users with different abilities	28 (26.2%)	46 (43.0%)	18 (16.8%)	10 (9.3%)	5 (4.6%)	3.8	107

Table 2 indicates that the most widely explored and utilized innovative technologies in Nigerian academic libraries are collaborative tools like Google Workspace or Microsoft 365, which received the highest mean score of 4.9, reflecting their significant role in facilitating real-time collaboration among users. Open access repositories and digital libraries also show strong adoption, with mean scores of 4.5 and 4.4 respectively, highlighting their importance in expanding access to research outputs and multimedia resources. Conversely, emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and blockchain security have lower mean scores around 3.6 to 3.8, suggesting that while these are recognized as valuable, their adoption remains limited, possibly due to resource constraints or technical challenges., aligning with research from Amuda and Yusuf (2021), which highlighted the positive impact of these technologies on library service delivery and information dissemination.

Challenges Encountered by Academic Librarians in the Usage of Innovative Technologies for Enhancing Information Dissemination

Academic librarians faced various challenges when implementing innovative technologies to enhance information dissemination. To identify the technological challenges faced by academic librarians encountered in exploring innovative technologies for enhancing information dissemination. The researchers provided a list of possible challenges for the respondents to tick as many as possible, table 3 summaries their responses.

Table 3: Challenges encountered by academic librarians in the usage of innovative technologies for enhancing information dissemination.

Challenges of innovative technologies in libraries	f	%
Limited financial resources such as budget constraints and cost of implementation and maintenance of innovative technologies	94	88.7
Lack of training and skill gaps for academic librarians	85	80.2
Librarian resistance in adopting new technologies	56	52.8
Inadequate Internet connectivity in my library	67	63.2
Outdated hardware and software in the library	62	58.5
Insufficient technical support such as lack of qualified IT personnel and technical support	70	66
Digital divide (inequality in access and inequitable access for users)	52	49.1
Security and privacy concerns such as cybersecurity threats and privacy issues	63	59.4
Interoperability issues like integration challenges within the library ecosystem	62	58.5

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Table 3 revealed that insufficient financial resources, such as budget limits and the expense of implementing and maintaining novel technology, scored 94 (88.7%), as did a lack of training and skill shortages for academic librarians in the use of innovative technologies, which scored 85 (80.2%). The least common obstacles reported by academic librarians investigated were security and privacy concerns, such as cybersecurity threats and privacy issues 52 (49.1%), and insufficient Internet connectivity to successfully use innovative technology in their libraries 56 (52.8%). This is consistent with the findings of Sahabi and Otobo (2021), who discovered that a lack of fundamental skills in the use of information technology has become a block for improved library services, as has a lack of skilled IT professionals and technical assistance. On the other hand, the study found that security and privacy concerns, such as cybersecurity threats and privacy issues, as well as insufficient Internet connectivity to effectively use innovative technologies in their libraries, were the least challenging factors affecting the exploration of innovative technologies for the enhancement of information dissemination in Nigerian libraries. This could imply that academic libraries' internet connectivity has increased over time, along with improved security measures such as CCTV and door scanners, among others.

Table 3: Strategies used by academic librarians in exploring innovative technologies for the enhancement of information dissemination

Strategies	F	%
Adequate funding	103	75.2
Alternative power supply	94	68.6
Continuous Learning, training and professional development of librarians	124	90.5
Collaboration and partnerships	107	78.1
Integration of digital tools and platforms	61	44.5
Experimentation and pilot projects	40	29.2
Monitoring trends and best practices	48	35.0
Strategic Planning	69	50.4
Robust Infrastructure	99	72.3
Change management	20	14.6
Privacy and Security Protocols	78	56.9
Accessibility Compliance	87	63.5
Sustainability Planning	37	27.0
Continuous Evaluation and Improvement	91	66.4

Table 3 shows that continuous learning, training, and professional development of librarians 124(90.5%) and collaboration and partnerships 107(78.1%) were the most common tactics employed in researching innovative technologies for information dissemination. Change management accounted for 20 (14.6%) of the strategies, while sustainability planning accounted for 37 (27.0%). This requires that librarians stay up to date on developing technologies by attending workshops, conferences, and seminars to better grasp their potential for information dissemination. This is consistent with the findings of Aina, Ogundipe, and Adebowale (2010) and Shehu (2020), who concluded that staff training and retraining will go a long way towards equipping librarians with contemporary and new library technologies.

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Conclusion

Based on the findings, it is evident that Nigerian academic libraries are actively adopting a range of innovative technologies, such as open access repositories, digital libraries, and social media platforms, to enhance information sharing and dissemination. The high utilisation of collaborative tools and integration of technologies like LMS and digital repositories demonstrates a strong commitment to improving access and engagement, despite challenges like limited funding and skill gaps. To sustain and expand these efforts, continuous professional development, strategic planning, and collaborative partnerships are essential, while addressing infrastructural and resource constraints remains critical for the successful implementation of innovative library technologies.

Recommendations

1. Academy libraries ought to dive into innovative technologies like virtual reality, augmented reality, and blockchain for authentication. These tools can really boost how they share information and engage with their communities.
2. Academic librarians should keep up with exploring innovative technologies to enhance their information dissemination to users irrespective of the time, location and format.
3. Tertiary institutions in Nigeria should really focus on investing and allocating more financial resources towards innovative technologies. This will help improve how library information is shared with users.
4. Academic librarians should keep learning and training, while also collaborating and partnering with tech companies. This way, they can really tap into the potential of innovative library technologies to enhance information access.

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