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Influence of Emerging Technologies on the Preservation of Library Resources in Tertiary Institutions in Rivers State

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Abstract

This study investigated the influence of emerging technologies on the preservation of library resources in tertiary institutions in Rivers State, Nigeria. A descriptive survey design was for the study. The population of the study was 60 library staff from 3 tertiary institutions in Rivers State. Purposive sampling technique was used to select three institutions while census sampling was employed to select the entire population. Data were gathered using a self-structured questionnaire. The reliability coefficient of the instrument was established as 0.87 determined through Cronbach Alpha using the test-retest method. Descriptive statistics, including mean and standard deviation, were used to analyze the data. The study revealed that emerging technologies, such as digital preservation, cloud computing, automation, Internet of Things (IoT), and Artificial Intelligence (AI), significantly influence the methods employed for preserving library resources. The study found that all the technologies were being implemented and that the challenges faced by tertiary institutions in adopting these technologies were also identified. It was recommended amongst others that tertiary institutions should prioritize digitizing valuable library resources, including rare books, manuscripts, and archives, Institutions should implement robust data backup systems, both onsite and offsite, to ensure the longevity and security of digital resources, training and continuous professional development programs should be offered to library staff, particularly in emerging technologies and tertiary institutions should establish partnerships with tech companies and research institutions to ensure the library's technology infrastructure remains updated.

Keywords: Emerging Technologies, Preservation methods, Tertiary Institutions, Digital Preservation, Internet of Things, Artificial Intelligence.

Introduction

Library is a collection of resources, typically in the form of books, journals, magazines, audio, video, or digital media, that are organized and made available for public or private use. Libraries can be physical spaces or digital platforms, and they serve as places for research, education, and leisure. In a physical library, users can borrow books or access materials, while digital libraries allow online access to a wide range of resources. Libraries often provide services like reading areas, internet access, educational programs, and reference assistance (Birkerts, 2019). The rapid advancement of emerging technologies has had a profound impact on various sectors, including education and library services. In tertiary institutions, libraries serve as crucial hubs for knowledge acquisition and preservation, housing a vast array of physical and digital resources. However, the

growing challenges associated with resource preservation, such as the deterioration of physical materials, limited space, and the rapid evolution of information formats, necessitate the adoption of new technologies for effective management and safeguarding of these resources (Baker & McCulley, 2021). In recent years, the use of digital technologies such as cloud computing, digital archiving, and automated cataloging systems has transformed the way libraries in tertiary institutions manage, store, and preserve information (Chowdhury, 2020). These technologies not only enhance the accessibility of resources but also provide efficient means for long-term preservation. For instance, digitization has become a critical tool in the preservation of fragile materials, offering a way to safeguard rare and deteriorating books, manuscripts, and other archival materials (Kurtz, 2022). Additionally, the integration of Artificial Intelligence (AI) and machine learning algorithms has improved the categorization and retrieval of information, ensuring that library resources remain accessible to users over time (Ramachandran, 2023).

Digital preservation has emerged as a critical solution for libraries in the 21st century. The transition to digital preservation techniques often involves scanning physical texts and storing them in formats that allow for easier access, retrieval, and long-term storage (Harvey, 2020). This method is particularly beneficial for protecting rare and fragile materials from the physical degradation caused by environmental factors like humidity and light exposure (Chisita, 2018). Cloud computing is another transformative technology influencing the preservation of library resources in tertiary institutions. The use of cloud storage platforms, such as Google Drive, Dropbox, and institutional cloud services, provides an affordable and scale-able solution for libraries to back up vast amounts of data, including e-books, journals, and multimedia content (Buchanan, Roberts, & Lawson, 2020). Cloud storage ensures that library resources are safe from physical damage caused by natural disasters, technical failures, or theft. For tertiary institutions in Rivers State, cloud-based services have facilitated collaboration between universities and research institutions. The backup and remote storage of digital library resources enhance their accessibility and security (Eze, Nwachukwu & Osifo-Dawodu, 2021). Furthermore, cloud computing allows for the integration of diverse systems, such as digitized archives and interactive research databases, ensuring a more unified and organized preservation strategy (Knutson, 2019).

Oyewole and Olorunfemi (2019) mused that, a key technological advancement is the automation of library management processes through Integrated Library Management Systems (ILMS). ILMS platforms automate functions such as cataloging, inventory management, circulation, and the preservation of resources. Tertiary institutions that make use of the technology -ILMS streamline their operations and ensure more effective resource management. The institutions libraries utilize ILMS to rack the condition of physical books and ensures the systematic processing of new acquisitions. These automated systems often come equipped with features for tracking the usage patterns of library materials, which can inform preservation decisions. Materials that are frequently borrowed or accessed may require more frequent maintenance or digital preservation efforts, such as high-resolution scanning or migration to newer digital formats (Durrani, Alam & Naveed, 2021).

The Internet of Things (IoT) has also been incorporated into library resource preservation in some tertiary institutions in Rivers State. IoT devices, such as smart sensors, are used to monitor environmental factors such as temperature, humidity, and light in library spaces, which can have a significant impact on the longevity of physical collections (Schwartz, 2020). By using these sensors, libraries can detect unfavorable conditions that may contribute to the deterioration of valuable resources and take corrective measures before irreversible damage occurs (Jumah & Alhassan, 2019). For example, some tertiary institutions libraries employs a smart climate control system to regulate temperature and humidity levels in storage areas, ensuring that fragile materials such as rare books and archives are preserved under optimal conditions. The use of IoT also extends to the management of library inventory, helping librarians to locate and maintain resources more efficiently (Omogbehin et al., 2021). More recently, Artificial intelligence (AI) is another emerging technology increasingly used in library resource management and preservation. AI-based systems are being applied to automate the categorization and indexing of materials, allowing for quicker retrieval and better organization of both physical and digital resources. AI technologies can also predict when certain materials are likely to degrade, thereby enabling timely interventions for their preservation (Zhang et al., 2020).

The use of AI in university libraries is helping staff manage and preserve digital collections more effectively. AI tools analyze user interactions with digital resources to suggest ways to improve access and optimize preservation strategies based on usage trends (Adams et al., 2021). AI can also facilitate data migration, ensuring that digital resources remain accessible as technology evolves. In addition, Radio Frequency Identification (RFID) technology has been implemented in some libraries for tracking physical books and automating inventory management. This technology has improved the efficiency of book circulation and reduced the occurrence of lost or misplaced items (Abubakar, 2020).

Virtual reality and augmented reality are also emerging technologies that offer innovative approaches to documentation and preservation. VR enables the creation of immersive, digital reconstructions of physical spaces or historical objects, providing a means of preserving and experiencing these artifacts in a virtual environment (Babbitt, 2022). This is particularly useful for preserving fragile materials or entire collections that may be at risk of physical deterioration. AR, on the other hand, allows users to interact with preserved artifacts in new ways. Through mobile devices or AR glasses, visitors to libraries can access contextual information or interactive elements about a specific item in the collection (Harris et al., 2023). This can enhance the experience of historical documents or works of art, providing educational opportunities and increasing public engagement with library materials. Other emerging technologies in library documentation and preservation that have revolutionized the ways in which libraries manage their collections includes; VR/AR, 3D scanning, blockchain, big data, and automated preservation tools all offer new opportunities for enhancing the sustainability, accessibility, and security of library materials.

According to Abubakar (2020), the introduction of these technologies offers solutions for both preserving the physical condition of books and improving the accessibility of digital content. Similarly, Olatokun (2021) highlights how the emerging technologies provides scale-able solutions for digital preservation, offering cost-effective methods for storing vast amounts of academic materials. However, the successful implementation of these technologies is often hindered by various challenges such as limited infrastructure, lack of skilled personnel, and financial constraints (Ali & Hassan, 2019). Research in Nigerian universities and colleges indicates that while there is significant interest in adopting emerging technologies, practical challenges remain in fully integrating these systems. Okoye and Egbe (2022) further pointed out that, libraries in some regions may also face difficulties in ensuring reliable internet connectivity, which can hinder the effective use of cloud-based solutions. In Rivers State, a region characterized by rapid infrastructural development and increasing academic demands, tertiary institutions in the state to somewhat are also experiencing the transformative influence of these emerging technologies on library resource management (Uche & Ndibe, 2021). However, the degree to which these technologies have been effectively integrated into library systems due to the challenges remains a subject of investigation. Hence, the need of the present study on influence of emerging technologies on the preservation of library resources in tertiary institutions in Rivers State.

Purpose of the Study

The general purpose of the study is to investigate influence of emerging technologies on the preservation of library resources in tertiary institutions in Rivers State. Specifically, the study seeks to:

1. determine how emerging technologies influence the methods used for preserving library resources in tertiary institutions in Rivers State.
2. find out the types of emerging technologies currently being implemented for the preservation of library resources in tertiary institutions in Rivers State.
3. ascertain the challenges tertiary institutions in Rivers State face in adopting emerging technologies for the preservation of library resources.

Research Questions

In order to achieve the above objectives, the research questions below were raised to guide the study:

1. How have emerging technologies influenced the methods used for preserving library resources in tertiary institutions in Rivers State?
2. What types of emerging technologies are currently being implemented for the preservation of library resources in tertiary institutions in Rivers State?

3. What are the challenges faced in adopting emerging technologies for the preservation of library resources?

Review of Related Literature

The influence of emerging technologies on the preservation of library resources in tertiary institutions has become a focal point for researchers and practitioners alike. This review explores the methods influenced by these technologies, the types of technologies implemented, and the challenges faced in their adoption.

Emerging technologies have transformed traditional preservation methods in tertiary institutions, enabling libraries to safeguard resources more efficiently and effectively. Digitization, for instance, has become a cornerstone of modern preservation, allowing libraries to convert physical resources into digital formats. According to Oluwafemi et al. (2021), digitization not only enhances the longevity of materials but also facilitates easier access and dissemination. Cloud computing is another significant advancement influencing preservation methods. As highlighted by Eze and Chukwu (2020), cloud storage solutions provide scalable and secure platforms for storing digital copies of library resources, mitigating risks associated with physical storage, such as environmental degradation and theft. Moreover, artificial intelligence (AI) has been employed to monitor the condition of physical resources, predicting and preventing deterioration through predictive analytics. Tertiary institutions have adopted these technologies to varying extents, with notable improvements in the preservation and accessibility of both physical and digital resources (Okoroafor & Nwankwo, 2022). However, the level of adoption often correlates with the availability of funding and technical expertise.

Several emerging technologies have been integrated into the preservation of library resources. Digital preservation tools, such as Archivematica and Preservica, are widely used to ensure the integrity and longevity of digital resources. These tools are designed to address issues related to obsolescence of formats and media (Lynch & Garcia, 2020). Blockchain technology has also been explored for its potential in ensuring the authenticity and traceability of digital records. A study by Oketunji et al. (2021) emphasized the utility of blockchain in creating immutable records, thus enhancing the reliability of preserved resources. Additionally, 3D scanning technologies are being employed to preserve rare and fragile artifacts, allowing users to interact with virtual replicas while protecting the originals. Virtual and augmented reality technologies further complement these efforts by creating immersive environments for resource engagement without direct handling (Ajayi & Ekpenyong, 2023).

Despite the benefits, several challenges impede the adoption of emerging technologies for preservation in tertiary institutions. Financial constraints remain a primary barrier, as the acquisition and maintenance of advanced technologies require significant investment. According

to Nwankwo and Uche (2021), many institutions in Rivers State struggle to allocate sufficient budgets for technological upgrades due to competing priorities.

Another challenge is the lack of technical expertise. Staff often require extensive training to effectively utilize emerging technologies. A study by Akinyele and Ojo (2020) revealed that insufficient training programs hinder the optimal use of digital preservation tools in Nigerian tertiary institutions. Infrastructure deficits, such as unreliable power supply and limited internet connectivity, further exacerbate these challenges. As observed by Chinedu et al. (2019), these infrastructural issues limit the deployment and sustained use of technologies, particularly in underfunded institutions. Moreover, resistance to change among library staff and management can delay the adoption of new technologies. Cultural and organizational inertia often necessitate strategic change management approaches to foster acceptance and integration (Obi & Adeyemi, 2022). The influence of emerging technologies on the preservation of library resources is profound, offering innovative methods and tools to enhance resource longevity and accessibility. However, challenges such as financial constraints, technical expertise, and infrastructural deficits must be addressed to fully realize their potential. Continued research and policy interventions are necessary to bridge these gaps and ensure the sustainable adoption of emerging technologies in tertiary institutions.

Methodology

The study adopted a descriptive survey design to elicit relevant data on influence of emerging technologies on the preservation of library resources in tertiary institutions in Rivers State. The population of the study was 60 library staff of 3 tertiary institutions in Rivers State which includes Rivers State University, University of Port Harcourt and Port Harcourt Polytechnic. Purposive sampling techniques was used to sample the institutions as they provide basic digital library services. Census sampling techniques was used to select the 60 library staff. The instrument for data collection was a self structured 25 items questionnaire titled "Influence of Emerging Technologies on the Preservation of Library Resources in Tertiary Institutions Questionnaire (IETPLRTIQ). The instrument was structured based on a modified 4-point Likert Scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SA) which was scored 4, 3, 2 and 1 respectively. The face and content validity of the instrument was ascertained by 2 experts who are senior lecturers in the field of study from Federal College of Education (Technical), Omoku. Test re-test was used technique was used to establish the reliability coefficient of the instrument as 0.87. Data was analyzed with descriptive statistics- mean and standard deviation.

Results

Research Question 1: How have emerging technologies influences the methods used for preserving library resources in tertiary institutions in Rivers State?

Table 1: Responses on how Emerging Technologies Influences the Methods used for Preserving Library Resources in Tertiary Institutions in Rivers State

Items	Mean	S.D	Decision
Machine learning algorithms improve the categorization and retrieval of information.	2.98	0 .55	Agreed
Integration of Artificial Intelligence (AI) ensures that library resources remain accessible to users over time.	2.65	0.84	Agreed
The transition to digital preservation techniques allows for easier access, retrieval, and long-term storage.	2.88	0.59	Agreed
Transition to digital preservation techniques protecting rare and fragile materials from the physical degradation caused by environmental humidity and light exposure.	3.07	0.42	Agreed
Radio Frequency Identification (RFID) technology aids in tracking physical books and automating inventory management.	2.81	0.62	Agreed
RFID technology improves the efficiency of book circulation and reduces the occurrence of lost or misplaced items.	3.04	0.48	Agreed
Cloud computing services, provides an affordable and salable solution for libraries to back up vast amounts of data, including e-books, journals, and multimedia content.	2.78	0.68	Agreed
Integrated Library Management Systems (ILMS) platforms automate helps in cataloging, inventory management, circulation, and the preservation of resources.	3.56	0.60	Agreed
The use of IoT devices, such as smart sensors, monitors temperature, humidity, and light in library spaces, which can have a significant impact on the longevity of physical collections.	2.87	0.76	Agreed
Virtual Reality (VR) preservers, AR, 3D scanning, block-chain, big data, and automated preservation tool are all implemented.			
Grand Total (Mean and Standard Deviation)	**2.66**	**0.55**	**Agreed**

The Table 1 above represents the means and standard deviations of how emerging technologies influences the methods used for preserving library resources in tertiary institutions in Rivers State. The table revealed that all 10 items received an "Agreed" level of consensus, suggesting a general recognition of the value of emerging technology—machine learning algorithms for library services (3.12, SD = 0.41). There is strong agreement that machine learning algorithms are implemented in library services, with a relatively low standard deviation, indicating consistency in responses. Integration of AI to provide effective service (2.57, SD = 0.69). While still in agreement, this item

shows a slightly lower score and higher variability. This suggests that AI integration may not be as pervasive or universally acknowledged across the institution as other technologies. Digital preservation techniques (2.68, SD = 0.76). The respondents agreed on the use of digital preservation techniques, but with a higher standard deviation, which suggests variability in the implementation or effectiveness of these techniques. Barcode or RFID tagging for physical inventory (3.05, SD = 0.52). There is strong consensus on the use of barcode or RFID tagging for physical inventory, with a fairly low variability, which indicates a common practice. Use of RFID in library sservices (2.72, SD = 0.62). While RFID technology is agreed upon, there seems to be moderate variability in how or when it is used in library services, possibly reflecting inconsistent application across different library services or spaces. Microfilming/scanning of print materials (3.04, SD = 0.48). Strong agreement with a low variability suggests that the practice of converting print materials into digital formats via microfilming or scanning is well-established. Cloud computing in digital library services (2.78, SD = 0.68). Libraries are utilizing cloud computing services, although the moderate standard deviation indicates some inconsistency in the extent or frequency of use. Integrated library management systems (ILMS) (3.56, SD = 0.60). There is a very strong agreement on the use of ILMS platforms, with relatively low variability, indicating that ILMS are well-integrated into library operations. IoT devices (e.g., smart sensors for environmental monitoring) (2.87, SD = 0.76). The use of IoT devices is moderately agreed upon, but the higher standard deviation suggests that the deployment or adoption of these devices may not be uniform across all library spaces or services. Virtual Reality (VR), Augmented Reality (AR), 3D Scanning, Blockchain, Big Data, and Automated Preservation Tools (2.66, SD = 0.55). While there is general agreement on the implementation of advanced technologies like VR, AR, and blockchain, the lower score and relatively low standard deviation suggest that their use is less common or still emerging.

This finding is in line with that of Okojie (2020), who found that emerging technologies such as digitization offers a sustainable method for preserving both rare and fragile materials that might otherwise be lost due to physical degradation. The finding also confirmed with that of Uwaifo (2021) that cloud technology has also revolutionized the way libraries store and manage digital resources and cloud storage offers an efficient and cost-effective alternative to traditional physical storage systems, which often require significant space and incur maintenance costs.

Research Question 2: What types of emerging technologies are currently being implemented for the preservation of library resources in tertiary institutions in Rivers State?

Table 2: Responses on types of Emerging Technologies that are Currently Being Implemented for Preserving Library Resources in Tertiary Institutions in Rivers State

Items	Mean	S.D	Decision
Machine Learning Algorithms are implemented for library services in your institution.	3.12	0 .41	Agreed
Your library uses the Integration of Artificial Intelligence (AI) to provide effective service to clientele.	2.57	0.69	Agreed
Your library operates with digital Preservation Techniques.	2.68	0.76	Agreed
Barcode/RFID tagging for physical inventory is used in your library.	3.05	0.52	Agreed
Radio Frequency Identification (RFID) is used at times in your library services to clientele.	2.72	0.62	Agreed
Microfilming/Scanning of print materials is implemented for use in the library.	3.04	0.48	Agreed
Cloud computing services are constantly in use in your digital library service.	2.78	0.68	Agreed
Library services included Integrated Library Management Systems (ILMS) platforms.	3.56	0.60	Agreed
Internet of Things devices, like smart sensors that monitor temperature, humidity, and light in library spaces are Implemented for use in your library.	2.87	0.76	Agreed
Virtual Reality (VR) preservers, AR, 3D scanning, blockchain, big data, and automated preservation tools are all implemented.	2.66	0.55	Agreed
Grand Total (Mean and Standard Deviation)	**2.90**	**0.60**	**Agreed**

The Table 2 above represents the means and standard deviations of the types of emerging technologies that are currently being implemented for the preservation of library resources in tertiary institutions in Rivers State. The table revealed that all the 10 items received an "Agreed" level of consensus, suggesting a general recognition of the emerging technologies that are currently being implemented for the preservation of library resources in tertiary institutions in Rivers State. Machine learning algorithms for library services (3.12, SD = 0.41). The mean score of 3.12 suggests that machine learning algorithms are somewhat implemented for library services, with a relatively low standard deviation of 0.41 indicating a consistent agreement across respondents. This implies that the library has incorporated machine learning in its operations, though it may not be a central or fully developed aspect yet. Integration of Artificial Intelligence (AI) (2.57, SD = 0.69). The mean score of 2.57 indicates a moderate level of agreement with the use of AI, with a higher standard deviation of 0.69. This suggests some diversity in responses, where AI is being integrated but perhaps not as extensively or effectively as other technologies. Digital preservation

techniques (2.68, SD = 0.76). A mean score of 2.68 with a standard deviation of 0.76 indicates a relatively moderate but consistent use of digital preservation techniques. Libraries are likely using technology to preserve digital content, but again, the approach may not be as comprehensive across all aspects of preservation. Barcode or RFID tagging for physical inventory (3.05, SD = 0.52). A mean score of 3.05 shows strong agreement, with a low standard deviation (0.52), indicating that the library is effectively using barcode or RFID technology to track physical inventory. This is a well-established technology in modern libraries. Use of Radio Frequency Identification (RFID) in library services (2.72, SD = 0.62). With a mean of 2.72 and a standard deviation of 0.62, the library appears to implement RFID technology on a moderate level, though the technology may not be ubiquitous in all library services. Microfilming/Scanning of print materials (3.04, = 0.48). The mean score of 3.04 indicates a strong agreement, showing that scanning and microfilming of print materials are well-established practices in the library, with a low standard deviation (0.48), reflecting consistency in usage. Cloud computing services (2.78, SD= 0.68). Cloud computing is moderately integrated into the library's digital services, with a mean score of 2.78 and a standard deviation of 0.68. This suggests that while cloud computing is being used, it may not be fully pervasive or leveraged for all aspects of library operations. Integrated Library Management Systems (ILMS) (3.56, SD = 0.60). ILMS platforms are strongly agreed upon with a mean score of 3.56, showing that these systems are central to the library's operations. The low standard deviation (0.60) indicates consistent usage and satisfaction across respondents. Internet of Things (IoT) devices for monitoring (2.87, SD = 0.78). IoT devices such as smart sensors for monitoring environmental factors are moderately implemented in the library, with a mean score of 2.87 and a standard deviation of 0.76, indicating some variability in how IoT is integrated. Advanced technologies (VR, AR, 3D Scanning, Blockchain, etc.) (2.66, SD = 0.55).nThe mean score of 2.66 and a standard deviation of 0.55 suggest that advanced technologies like VR, AR, and blockchain are implemented but not on a widespread or central scale. The relatively consistent responses indicate that these technologies are more experimental or niche in their application.

This finding is in line with the findings of Battu and Rao (2020) who found that the use of emerging technologies including cloud storage, and automated systems for archiving resources has been widely adopted to ensure the long-term preservation and accessibility of academic materials.

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Research Question 3: What challenges do tertiary institutions in Rivers State face in adopting emerging technologies for the preservation of library resources?

Table 3: Responses on challenges Tertiary Institutions in Rivers State Face in Adopting Emerging Technologies for the Preservation of Library Resources

Items	Mean	S.D	Decision
Insufficient funding.	2.60	.82	Agreed
Lack of skilled personnel.	3.07	.76	Agreed
Technological limitations or incompatibility.	2.87	.82	Agreed
Resistance from library staff or stakeholders.	2.57	.75	Agreed
Inadequate infrastructure (e.g., internet access, storage space).	3.10	.41	Agreed
Grand Total (Mean and Standard Deviation)	**2.86**	**0.71**	**Agreed**

Table 3 above represents the means and standard deviations of the challenges tertiary institutions in Rivers State face in adopting emerging technologies for the preservation of library resources. The table revealed that all the 5 items received an "Agreed" level of consensus, suggesting a general recognition of the challenges tertiary institutions in Rivers State face in adopting emerging technologies for the preservation of library resources. Insufficient funding (Mean = 2.60, SD = 0.82). The mean score indicates a moderate level of agreement with the statement, with a relatively high standard deviation suggesting varied opinions. Some respondents perceived insufficient funding as a more significant issue, while others see it as less problematic. Lack of skilled personnel (Mean = 3.07, SD = 0.76). The higher mean score indicates stronger agreement compared to the previous item, and the standard deviation is slightly lower, suggesting more consensus among respondents that lack of skilled personnel is a notable challenge. This appears to be one of the more pressing issues. Technological limitations or incompatibility (Mean = 2.87, SD = 0.82). The mean indicates a moderate agreement, though not as strong as the lack of skilled personnel. The standard deviation is similar to that for insufficient funding, indicating some variation in how respondents view technological barriers. Resistance from library staff or stakeholders (Mean = 2.57, SD = 0.75). The mean score is slightly lower, suggesting a less strong consensus that resistance from library staff or stakeholders is a challenge. The standard deviation is fairly tight, showing relatively consistent views on this item, but it's still less of a concern than others. Inadequate infrastructure (e.g., internet access, storage space) (Mean = 3.10, SD = 0.41). This item has the highest mean score, suggesting the greatest agreement that inadequate infrastructure is a challenge. The low standard deviation indicates a high level of agreement among respondents on this issue, with most perceiving it as barrier.

This finding is in tandem with that of Adams and Ezeani (2023), that one major obstacle to the implementation of the emerging technologies is the inadequate infrastructure, particularly in rural or underfunded institutions, which may lack the necessary internet connectivity, electricity, and hardware to effectively implement these technologies. Additionally, there is a gap in technical

skills and training among library staff, which limits their ability to fully utilize these technologies. The finding is also in agreement with that of Onuorah et al. (2022) that many librarians require continuous professional development to manage the evolving technological tools required for effective resource preservation.

Conclusion

The study concluded that, emerging technologies such as digital preservation, cloud computing, automation, IoT, and AI have significantly influenced the methods used for preserving library resources in tertiary institutions in Rivers State. These technologies have enhanced the ability to safeguard valuable library materials, making them more accessible, secure, and sustainable for future generations. However, there is a need for continued investment in technological infrastructure and human capacity to ensure that libraries can effectively leverage these innovations. As technology continues to advance, it is expected that the methods for preserving library resources in Rivers State will continue to evolve and improve.

Recommendations

Based on the findings, the following recommendations were made:

1. Tertiary institutions should prioritize digitizing valuable library resources, including rare books, manuscripts, and archives. Implementing digital repositories and using technologies like Optical Character Recognition (OCR) can help preserve texts and improve accessibility.
2. Institutions should implement robust data backup systems, both onsite and offsite, to ensure the longevity and security of digital resources. Cloud-based storage solutions and regular backup schedules can prevent data loss due to hardware failure or disasters.
3. Integrate Automated Libraries in Rivers State should invest in Integrated Library Management Systems (ILMS) or Library Management Software to automate cataloging, tracking, and preservation processes. This would improve resource tracking, reduce human error, and enhance resource availability.
4. Training and continuous professional development programs should be offered to library staff, particularly in emerging technologies such as digital archiving, metadata management, and cybersecurity. Staff should be equipped with the knowledge to manage digital resources effectively.
5. Tertiary institutions should establish partnerships with tech companies and research institutions to ensure the library's technology infrastructure remains updated. Collaboration could also lead to the development of customized solutions for the preservation of library resources.

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