

LEVERAGING EMERGING TECHNOLOGIES FOR SUSTAINABLE LIBRARY AND INFORMATION SCIENCE RESEARCH AND PRACTICE AT FEDERAL UNIVERSITY LOKOJA, NIGERIA

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Abstract

This study examines the application of emerging technologies for sustainable library and information science research and practice in Federal University Lokoja, Kogi State, Nigeria. The COVID-19 Pandemic can be perceived as a trigger for the explosion of emerging and innovative technologies. Online conferencing, learning management systems (LMS), and other innovative technologies. Four objectives and four research questions were formulated to guide the study. The study adopts structured questionnaire will be used to collect the data from the respondents, and data collected will be analysed using frequency, percentages and mean. The possible findings will reflect the area LIS professionals apply emerging and innovative technologies for sustainable LIS research and practices, types of emerging and innovative technologies applied for sustainable LIS research and practice, benefits of applying emerging and innovative technologies for sustainable LIS research and practice and barrier in application of emerging and innovative technologies for sustainable LIS research and practice with recommendation and conclusions.

Keywords: Emerging Innovative Technologies, Sustainable LIS Research and Practice

Introduction

The development of technologies has become increasingly become an important aspect of effective administration and delivery of academic library services. This trend reflects a global movement toward digital transformation aimed at improving access to information, enhancing the user experience, and supporting high-quality research. Technological advancement continues to drive significant changes in Library and Information Science (LIS) practice, offering academic libraries new opportunities to strengthen their role as research and learning centers. Academic libraries in developing countries, such as Nigeria, must strategically adopt these technologies to maintain relevance and make a meaningful contribution to institutional growth. At the Federal University Lokoja, the effective use of emerging technologies is crucial for promoting sustainable practices and research within Library and Information Science (LIS). According Afukidang and Aghadiuno (2022) emerging technologies is an innovations characterized by rapid development, significant impact, and a degree of uncertainty, often marked by their novel nature and potential to transform existing systems.

Emerging technologies include the: social media applications, audio files, research data, cloud computing, artificial Intelligence (AI), robotics, big data, blockchain technology, drones, smart libraries, augmented reality, and virtual reality applied in libraries (Ball, 2019; Princh, 2022). The development and integration of emerging technologies in libraries has had a considerable impact on research output, accessibility, and dissemination (Vysakh, 2020). Emerging technologies have proved to boast capabilities, increase creativity, problem-solving skills, processes innovation and add value to research output, and enhance service delivery strengthens LIS practices and future opportunities (Bichi, 2020; Moruf & Dangani 2020). They pointed out that Open-Source emerging technologies has promoted research and innovations in LIS practice. With all these opportunities and potential emerging technological development the case scenario in developing countries is worrisome.

LIS professionals need to be adequately equipped with the requisites knowledge of emerging innovative technology for sustainable research and Library practice (Owolabi et.al 2022). With an understanding of emerging technologies, LIS professionals will benefit maximally from ways their library practices and research productivity can be improved/enhanced. The application of emerging technology in research output offers tremendous benefits such as new discovery, access and use of data across the globe and the enhancement of research productivity, collaboration amongst other. According to Calvert and Kennedy (2020), emerging technologies are profoundly reshaping learning and research, creating new pathways to enhance student outcomes and transform academic inquiry. This evolving landscape brings both significant disruptions and opportunities for academic libraries to advance sustainable and future-focused LIS research and practice.

The transformative capabilities of information technology as well as access to remote library information resources with availability of modern sophisticated research tools and stirred the subject of the benefits of library service in research productivity (Arumuru, 2020). Despite the development in the continuous growth in emerging technology and innovation to enhance access to information and with the availability of research tools studies have shown that the research production of scholars in Nigeria and Africa is relative low as compared to the

developed country (Oluwasanu et al., 2019 Adeyeye, & Oladokun 2023). Given the benefit of research to sustainable national development and library practices it implies that if libraries are well funded and equipped they are capable of showcasing the research output as well as assisting researcher with resources to boost their research. There is increase in research productivity by the deployment of emerging technologies in information resource management, research data management, copyright advisory, citation management, scholarly communication, data analysis services, research preservation and curation, and digital literacy training, (Das & Banerjee, 2021; Keller, 2015; Sewell & Kingsley, 2017). With the global increase in research output as a result of the use of various technologies many young universities especially those established with a decade ago are also adapting to the use of emerging technologies for research. This has necessitated the need to investigate the how these universities are leveraging on emerging technologies for sustainable research and practice, particularly in library and information science at Federal University Lokoja, Nigeria.

Statement of the Problem

Libraries over the years have adopted various kinds of emerging technologies towards the improvement of libraries and information science practices and research. These technologies include library automation systems, integrated library management software, digital infrastructures, and a range of innovations that have transformed traditional library operations. Despite the adoption of these technologies, many of which are imported and introduced with high expectations. However, their actual impact on Library and Information Science (LIS) research and professional practice in Nigeria has been minimal. Many LIS professionals are not making effective use of these tools to boost research productivity or to enhance the quality of library services. Moreover, the application of emerging technologies in LIS appears inconsistent and underexplored, especially in academic institutions. The shortage of empirical studies that investigate how these technologies are utilized for sustainable LIS research and practice further highlights a significant knowledge gap. It is on this premise that this study seeks to examine the application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria.

Objective of the Study

The main aim of the study is to investigate how professionals in the field of Library and Information Science leverage on emerging technologies for sustainable library and information science research and practice at Federal University Lokoja, Nigeria. The specific objectives are to:

1. Examine the types of emerging and innovative technologies applied for sustainable LIS research and practice in Nigeria.
2. Determine areas LIS professional apply emerging and innovative technologies for sustainable LIS research and practice in Nigeria.
3. Ascertain the benefits of applying emerging and innovative technologies for sustainable LIS research and practice in Nigeria.
4. Identify barriers in application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria.

Literature review

The application of emerging technology is now a global trend that is rapidly making wave for sustainable LIS research and practice.

Types of emerging and innovative technologies applied for sustainable LIS research and practice.

Library Emerging technologies are transforming the landscape of Library and Information Science (LIS) by providing new tools and frameworks that enhance research productivity and service delivery. According to Library Guides (2022), various tools such as Open Science Framework, DMP Tool, Research Works Archive, RedCap, Perma.cc, and ORCID have been instrumental in improving research data management and scholarly communication. These tools not only support research workflows but also promote transparency, data preservation, and collaboration which are the key elements of sustainable LIS research.

Similarly, Ocholla (2021), in an extensive review of academic literature indexed in the SCOPUS database between 2012 and 2021, examined the preparedness of academic libraries for the Fourth Industrial Revolution (4IR). The review revealed a sharp increase in global research output facilitated by the adoption of different emerging technologies. Ocholla emphasized that key technologies driving this transformation include Artificial Intelligence (AI), Machine Learning, Big Data, Block chain, and the Internet of Things (IoT). These innovations are not only reshaping academic research but are also improving library practices by enhance their decision-making, and improving user engagement.

While both sources acknowledge the potential of emerging technologies, their focus differs. Library Guides emphasize tools and their practical applications, while Ocholla presents the analysis of technological trends and library readiness. The convergence of these perspectives illustrates that while emerging technological tools are readily available, their strategic implementation remains inconsistent, especially in developing countries where infrastructural and capacity challenges persist.

Areas LIS professional apply emerging and innovative technologies for sustainable research and practice

Emerging technologies are increasingly being applied across a wide range of library operations and research activities, transforming how information is accessed, managed, and disseminated. Okwoli et al. (2024) conducted a study to explore the role of innovative technologies in enhancing information dissemination among academic and research librarians. Using a survey method with a population of 534 and a sample size of 107 respondents selected through random sampling, the study employed a questionnaire for data collection and analyzed the results using frequency, mean, and percentage. Their findings revealed that open access repositories and library automation software such as Koha, Greenstone, and D-Space were the predominant technologies in use. This suggests that librarians are increasingly embracing digital platforms for resource management and information sharing, highlighting a growing trend toward automation and open access.

In a related but broader perspective, Moruf and Dangani (2020) identified a wider range of emerging technologies applied in LIS research, including bibliographic citation management software (e.g., Mendeley), instructional system design platforms (e.g., Blackboard, Edmodo), electronic copyright management systems, and classroom management tools (e.g., Moodle, Google Classroom, Canva). Their view expands the conversation by including not only tools used in information management but also those that directly support teaching, learning, and digital scholarship in academic settings. This broader classification points to the convergence

between LIS research and pedagogical technologies, underscoring the interdisciplinary nature of modern LIS practice.

Agbetuyi and Isah (2021) carried out a similar study, where emerging technology applied in library practices are identify as: Online Public Access Catalogues (OPACs), mobile-based technologies, Web 2.0 technologies, institutional repositories, and cloud computing technologies. This study emphasizes the infrastructural and interactive dimensions of technological applications, drawing attention to both access and engagement. Their perspective is important as it highlights the evolution of libraries into more networked, user-centered environments where digital tools mediate almost every aspect of library services.

Further reinforcing these views, Hagiwara et al. (2022) and Akande & Popoola (2022) observed that researchers increasingly rely on a variety of online information resources and digital reference services to support their academic work. This is consistent with the findings of Wan (2022) and Panda & Chakravarty (2022), who assert that librarians are expanding traditional reference services by integrating emerging technologies such as AI-enabled chatbots. These chatbots are now used to provide 24/7 digital reference support, even beyond official working hours. The ability to offer real-time, round-the-clock assistance through electronic information resources greatly enhances research support and promotes a culture of continuous academic engagement. These developments, therefore, represent a significant step forward in enhancing research productivity and advancing the frontiers of LIS practice.

While all these sources acknowledge the transformative potential of emerging technologies, they approach it from different perspectives ranging from infrastructure and automation (Okwoli et al., 2024), pedagogical integration (Moruf & Dangani, 2020), systems classification (Agbetuyi & Isah, 2021), to user-centered services like AI-powered reference tools (Hagiwara et al., 2022; Panda & Chakravarty, 2022). This diversity of viewpoints reflects the multifaceted role emerging technologies play in modern LIS practice. Positioning the perceptive of various studies, it becomes evident that although the types and applications of emerging technologies are growing, a gap still exists in how these technologies are being systematically integrated to ensure sustainable LIS research and practice, especially within under-resourced academic environments.

Benefits of applying of emerging and innovative technologies for sustainable LIS research and practice

Calvert Calvert and Kennedy (2020) reveal that librarians in the United States are making significant progress in research data management by leveraging emerging technologies. They note several advantages associated with this advancement, including cost reduction in data curation, enhanced opportunities for new discoveries, and improved access to research data from both local and global sources. In particular, they emphasize the value librarians add through expert data processing and organization, which supports researchers by offering curated datasets relevant to specific studies. Moreover, they highlight the benefits of data sharing, preservation, and collaborative exchange among researchers. Libraries in developed countries, they argue, are capitalizing on these benefits by creating institutional data repositories and partnering with global platforms such as Zenodo and Dryad. These initiatives

enable researchers to focus more on knowledge generation while easing the burden of data handling.

Building on this, EDUCBA (2021) underscores the role of data mining technologies—such as RapidMiner, Orange, and Weka—in organizing and analyzing large volumes of information. These tools help to uncover patterns and insights from complex datasets, bringing structure to the information landscape and reinforcing the critical role of libraries in data analytics and research support. While these studies largely focus on practices in technologically advanced settings, they offer valuable insights into how emerging technologies can be used to transform LIS research support services in any context. The emphasis on infrastructure and tool deployment by Calvert and Kennedy (2020), and EDUCBA (2021), reflects a technologically driven model of library transformation. However, this perspective tends to overlook the human and ethical dimensions of technological integration.

In contrast, Abbasi et al. (2024) take a more comprehensive and socially responsive approach. Their study on emerging trends in Library and Information Science research highlights that the transformation of the LIS field is not just a result of technological advancement but is also driven by evolving user expectations and the imperative for equitable access to information. They identify technologies such as artificial intelligence (AI), big data analytics, and blockchain as central to the modernization of library services. Importantly, they also explore the ethical implications of these innovations, such as data privacy concerns and algorithmic bias, pointing to the growing need for ethical and responsible technology use in libraries. Moreover, Abbasi et al. advocate for user-centered and inclusive approaches that prioritize community engagement and accessibility. They argue for a multidisciplinary orientation in LIS research, encouraging collaborations across academic fields to better meet the diverse needs of modern library users. This broader viewpoint situates libraries not only as technology adopters but as critical agents in addressing complex social, ethical, and academic challenges in the digital era.

These studies provide a rich perspective on the benefits of emerging technology on LIS research and practice. While Calvert and Kennedy (2020) and EDUCBA (2021) focus more on technological benefits and operational efficiency, Abbasi et al. (2024) stress the need for balance between innovation, inclusivity, and ethical responsibility. This divergence is essential, as it highlights the multi-dimensional nature of LIS transformation. In positioning this study, it is clear that emerging technologies offer powerful tools for advancing research and innovation in LIS. However, for institutions like the Federal University Lokoja to benefit fully, there must be not only access to technology but also strategic frameworks that address ethical use, capacity development, and cross-disciplinary collaboration. These elements are vital to ensuring that technological adoption is sustainable, impactful, and aligned with the broader goals of equitable knowledge access and community relevance

Barriers toward application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria

Many factors have continued to retard advancement of emerging technology that are fundamental to research and innovation includes lack of access to high quality and sophisticated technological tools like those deplored in developed countries. Other difficulties to effective deployment of emerging and innovative technology are lack of research and innovation centres, unstable nature of technologies, inadequate support to research and innovations both at university and national level, inappropriate use of research fund where they are readily available and lack of training and more (Ajie, 2019; Lubanga and Mamba, 2021, Saibakuma, 2021). Despite these challenges, emerging technologies have considerable potential to transform research and practice in library and information science if the challenges are properly address.

Despite the promising opportunities presented by emerging technologies, several challenges continue to hinder their effective deployment in Nigerian libraries and academic environments. Bichi (2021) identifies key obstacles including poor search skills among users, inadequate budgetary provisions, erratic power supply, and a lack of management training and staff retraining. These challenges reflect a systemic deficiency in both technical and human resource development, which impairs the adoption and sustainability of innovative technologies in library services.

Simlialy, Lubanga and Mumba (2021) and Saibakumo (2021) emphasize that the adoption of new technologies in LIS has been seriously limited by structural and institutional shortcomings. These include insufficient funding, inadequate technological capacity, absence of research and innovation centers, and poor infrastructure. They also draw attention to the unstable nature of emerging technologies, the frequent changes in tools and platforms, and the lack of informatics knowledge among LIS professionals. These scholars argue that these issues are compounded by weak government support, leaving institutions unprepared for rapid technological evolution. Their perspective is especially relevant in contexts like Nigeria, where economic and infrastructural constraints are recurrent issues.

Bawack and Nkolo (2018) offer a more policy-driven analysis, asserting that the slow adoption of emerging technologies in developing countries stems from the absence of clearly defined institutional policies, infrastructural deficits, and a shortage of visionary and innovative library leaders. Their argument shifts the focus from operational deficiencies to strategic leadership and policy formulation. According to them, sustainable integration of technology in LIS cannot occur without deliberate institutional frameworks and proactive leadership. These differing viewpoints while emphasizing related themes to approach the barriers from different angles. Bichi (2021) and Lubanga and Mumba (2021) highlight practical and infrastructural gaps, focusing on immediate operational constraints. In contrast, Bawack and Nkolo (2018) look at long-term strategic issues, such as institutional readiness, policy direction, and leadership. Both perspectives are crucial; the former underscores the need for capacity building and funding, while the latter points to the importance of leadership and planning.

Drawing from the perceptive of authors, this study holds that addressing the barriers to technology adoption in LIS requires a dual approach: investing in infrastructural and human capacity on one hand, and formulating robust institutional and policy frameworks on the other. Libraries must not only be equipped with tools but also guided by visionary policies and innovative leadership to navigate the rapid evolution of technology effectively.

Methodology

The study adopted descriptive survey design, the population of the study consisted of the entire 32 LIS professionals in the university library, at federal university Lokoja, no sampling was done due to the manageable size of the population, hence, the entire population was used for the study. The instrument used for data collection was structured questionnaire contains 42 items soliciting response from respondent on the research questions raised for the study. The researchers personal administered that questionnaire during working hour that enhanced the return rate. Data collected where analyzed using descriptive statistics of mean and standard deviation. A rating of (2.50) scale was used to determine the mean scores of the respondents to all the items and any item ranked from (2.50) and above was regarded as positive/agree while any item ranked below (2.50) was regarded as negative/disagree. The results are presented in tables.

Result of Findings and Discussions

Table 1: Mean and standard deviation of the types of emerging and innovative technologies tools applied for sustainable LIS research and practice in Nigeria

	N	Minim um	Maxi mum	Sum	Mean	Std. Deviation
Artificial intelligence	32	1.00	4.00	107.00	3.3438	.65300
Machine learning	32	1.00	4.00	105.00	3.2813	.63421
Internet of things	32	3.00	4.00	109.00	3.4063	.49899
Natural language processing NLP	32	3.00	4.00	106.00	3.3125	.47093
Blockchain technology	32	3.00	4.00	109.00	3.4063	.49899
Cloud computing technology	32	2.00	4.00	107.00	5.5312	.77674
Virtual reality	32	2.00	4.00	101.00	3.1563	.44789
Augmented reality	32	3.00	4.00	101.00	3.1562	.36890
Big data	32	2.00	3.00	101.00	4.0938	.29369
Mobile and wearable technologies for	32	3.00	4.00	108.00	3.3750	.49187

linked data and semantic: web for interconnected knowledge graphs and data discovery	32	3.00	4.00	108.00	3.375	.49187
Valid N (listwise)	32					

Field survey: 2024

Table 1, revealed the types of emerging and innovative technologies tools applied for sustainable LIS research and practice in Nigeria. Responses from respondents in Federal University Lokoja shows that most types of the emerging technology tools are largely applied with cloud computing technology having the mean score of (5.5312.) and big data (4.0938) rated highest. artificial intelligence, machine learning, Internet of things, natural language processing (NLP), blockchain technology, cloud computing technology, virtual reality, augmented reality, big data, Mobile and wearable technologies for, linked data and semantic: web for interconnected knowledge graphs and data discovery. Interestingly, the mean score of these technologies varies more widely than in table 1, ranging from 3.1562 to 5.5312. These suggest that respondents apply the different types of technologies differently. With Cloud computing has the highest score (5.5312), which is notably higher than other technologies. This indicates that respondents see cloud computing as particularly crucial for library services. However, it has a relatively high standard deviation (0.77674) suggesting more varied opinion on technological tools applied for sustainable LIS research and practice in Nigeria. The findings of this study is in consistent with Library Guides, (2022) and Ocholla, (2021) on Internet of Thing (IOT), Machine Learning, Artificial Intelligence (AI), big-data, block chain technology are applied in research.

Table 2: Mean and standard deviation of areas LIS Professional apply emerging technologies for sustainable LIS research practice in Nigeria.

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Monitoring of library environment	31	3.00	4.00	104.00	3.3548	.48637
Data analyses and visualization	32	3.00	4.00	107.00	3.3437	.48256
Enhance service delivery bigdata	32	2.00	4.00	106.00	3.3125	.59229
Scanning tools and preservation 3d	31	3.00	4.00	108.00	3.4839	.50800
Text analysis natural language processing tools	32	1.00	4.00	104.00	3.2500	.67202

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Cloud computing platforms (google cloud for collaboration)	32	1.00	4.00	106.00	3.3125	.69270
Digital scholarship tools: digital commons, open journals system for research dissemination	32	1.00	4.00	109.00	3.4063	.66524
Secure and de-centralize data management	32	2.00	4.00	107.00	3.3437	.54532
Valid N (listwise)	30					

Field survey: 2024

Result presented in table 2, above reveals the areas LIS Professional apply emerging technologies for sustainable LIS research practice in Nigeria. Responses from respondents in Federal University Lokoja shows that Monitoring of library environment, Data analyses and visualization, enhance service delivery bigdata, scanning tools and preservation 3d, text analysis natural language processing tools, cloud computing platforms (google cloud for collaboration), digital scholarship tools: digital commons, open journals system for research dissemination and secure and de-centralize data management received a positive response with a relatively high mean score ranging from 3.2500 to 3.4839 suggesting respondents view these technologies with importance. Scanning tools and preservation 3D have the highest score (3.4839) followed by monitoring library environment and data analysis and visualization with mean scores of (3.3548) and (3.3437) respectively. The standard deviation for all the items in table 1 are relatively low, ranging (0.36890-0.69270) further consolidating the result from the mean calculation. The data suggests respondents view these technological aspects of library service as important and are applied. The finding of this study collaborates Okwoli et.al, (2024) who noted that emerging technologies are use for information dissemination. It contrast with Moruf and Dangani (2020), who outlined specific emerging technologies that are applied in LIS research includes, bibliographic citation management software (Mendeley); instructional system design software such as Blackboard, Edmodo; electronic copyright management systems; classroom management software such as Moodle, Google Classroom, Canva, other than library services. And Hagiwara et al., 2022; Akande & Popoola, 2022) noted that researcher leverage on online information resources digital reference services, for research; in consistent, with Wan, 2022; Panda & Chakravarty, (2022) that asserted that Librarians have expanded reference services through the application of emerging technologies.

Table 3: Mean and standard deviation on the benefits derived from the application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria

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	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Library assessment and strategic planning supports data driven decision making	32	3.00	4.00	113.00	3.5313	.50701
Simplification of research evaluation	32	2.00	4.00	112.00	3.5000	.56796
Information literacy, instruction, empowers users to effectively locate and evaluate information	30	3.00	4.00	104.00	3.4667	.50742
Professional development for librarians and information professionals	32	3.00	4.00	146.00	3.5625	.02960
Supports for continuous learning	32	3.00	4.00	111.00	3.4688	.50701
Improve access to information (Accessibility and Inclusiveness)	32	1.00	4.00	113.00	3.5313	.67127
Library services innovation: it promotes innovative library services like digital reference, digital collections and makerspace	32	1.00	4.00	110.00	3.4375	.66901
Enhance collaboration: it facilitates collaborations amongst librarians and stakeholder fostering a community of practice	32	3.00	4.00	110.00	3.4375	.50402
	32	3.00	4.00	102.00	4.7500	.17972

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Improve information retrieval: innovative technology enhances the discovery and access to information enabling researchers to quickly locate relevant resources	32	3.00	4.00	111.00	3.4687	.50701
Digital Analysis and visualization: it provides tools for data analysis, visualization and presentations supporting research and decision making	32	3.00	4.00	112.00	4.7500	.17972
Digital scholarship: it promotes and encourages new forms of scholarship like data humanities, data science and open publishing.	32	3.00	4.00	110.00	3.4375	.50402
Valid N (listwise)	30					

Field survey: 2024

The results in table 3 presents data on the benefits derived from the application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria. all the items listed on the table have relatively high mean scores, ranging from 3.4375 to 4.7500, suggesting that respondents generally viewed benefits derived from the application of emerging and innovative technologies for sustainable LIS research and practice as important and impactful. Data analysis and visualization, and enhanced collaboration represents the items with the highest rated mean scores, both with a mean score of 4.7500. this shows that respondents place high importance on tools for data analysis, visualization and presentation, as well as on facilitating collaborations among librarians and stakeholders. Interestingly, these items also have the lowest standard deviation (0.17972), suggesting a strong consensus among respondents on the benefits derived from the application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria. the standard deviation for most of the listed are relatively low (between 0.02960 to 0.67127), indicating a generally high level of agreement among respondents. However, items like support for continuous learning and improved access to information have slightly high standard deviations, suggesting a more varied opinion. The finding of this study supports Calvert and Kennedy (2020) that revealed librarians in the United States, are benefiting from making advances in research data management, leveraging emerging technologies. They highlight the enormous benefits, such as reduction in the cost of data curation, opportunities for new discover and access. Similarly, EDUCBA, (2021) noted other benefits in the use data mining emerging technologies tools

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like Rapid miner, Orange, Weka etc can be deployed to bring order and organization to information environment.

Table 4: Mean and standard deviation on the barriers toward application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria.

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Lack of standardization and incomparability of different technology	31	2.00	4.00	106.00	3.4194	.56416
Evaluating and validating new technologies	32	1.00	4.00	102.00	3.1875	.78030
Lack of fund: insufficient resources to invest in new technology and infrastructural development	32	2.00	4.00	107.00	3.3438	.54532
Limited technical expertise: lack of skilled professionals to implement and maintain new technologies	32	2.00	4.00	106.00	3.3125	.53506
Resistance and Reluctance to change and new methods and processes	32	3.00	4.00	107.00	3.3437	.48256
Data privacy security concerns: fear and anxiety of data breaches and cyber-attacks.	32	3.00	4.00	108.00	3.3750	.49187
Ethical considerations concern about the potential impact on employment, bias and transparency	32	2.00	4.00	103.00	3.2188	.55267
Inadequate hardware, software and network infrastructure	32	3.00	4.00	105.00	3.2813	.45680
Regulatory and legal barriers	32	2.00	4.00	107.00	3.3437	.60158

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Disparities in accessing technology particularly for marginalized groups	32	2.00	4.00	104.00	3.2500	.50800
Differences in language culture and belief affecting adoption	32	2.00	4.00	99.00	3.0938	.53033
Valid N (listwise)	31					

Field survey: 2024

Table 4 above shows the responses from respondents on the barriers toward application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria. The items examined includes “Lack of standardization and incomparability of different technology, Evaluating and validating new technologies, Lack of fund: insufficient resources to invest in new technology and infrastructural development, Limited technical expertise: lack of skilled professionals to implement and maintain new technologies, Resistance and Reluctance to change and new methods and processes, Data privacy security concerns: fear and anxiety of data breaches and cyber-attacks, Ethical considerations concern about the potential impact on employment, bias and transparency, Inadequate hardware, software and network infrastructure, Regulatory and legal barriers, Disparities in accessing technology particularly for marginalized groups and Differences in language culture and belief affecting adoption”.

The mean scores for the entire items range from 2.0938 to 3.4194, indicating that respondents view the severity of the challenges differently. Lack of standardization and incomparability of different technology has the highest mean score at 3.4194. this suggest that respondents see the lack of standardization and interoperability across technologies as a significant challenge on the application of emerging and innovative technologies for sustainable LIS research and practice in Nigeria. Respondents seem to view "Evaluating and validating new technologies" as the least severe challenge, with a mean score of 2.1875. This indicates that while evaluating new technologies may be a consideration, it is not seen as a major obstacle compared to other factors. The standard deviations for most items are relatively low, ranging from 0.45680 to 0.78030, suggesting a fair degree of consensus among respondents regarding the significance of these challenges.

The finding collaborates with Bichi (2021); Lubanga and Mumba (2021); Saibakumo (2021) who noted that lack of search skills, inadequate budget, epileptic power supplies, and insufficient management training and staff retraining, insufficient funding, a lack of capacity, and inadequate maintenance, a lack of adequately-established centers for research and innovation, the unstable nature and rapid change of technological advancement, with record conversion linked to infrastructure problems, a lack of informatics/learning, and a lack of government assistance are barriers to application of emerging technologies.

Conclusion

The level of research output in higher institutions of Nigeria and across the global indicates that emerging technologies are applied to some extent in research and for sustainable library

practice. Researchers leveraging on artificial intelligence, blockchain and internet of Things (IoT) will enhance information access, improve users experience facilitates research innovation by the deployment of emerging technologies and it will position Federal University Lokoja, library as a pacesetter in LIS research and practice, this will certainly enhance the academic experience and make their scholarly work visible globally thereby contributing to more sustainable future.

Recommendation

1. LIS professionals should leverage more on virtual reality and augmented reality technologies to enable researcher collaborate remotely.
2. Need for staff education of librarians on the use of various research bibliographic citation management software (Mendeley) and electronic copyright management systems; that can assist them.
3. Library and Information Science researcher should continue to engage in training and professional development opportunities for library staff to stay abreast on emerging technologies to maximise from it.
4. Libraries should adopt holistic approach in embracing emerging technology as the in-thing.

References

- Abbasi, M. W., Channar, W. A., Abbasi, A. B., Bhatti, A. A., & Rind, M. A. (2024). Emerging Trends in Library and Information Science Research. *Journal of Social Sciences Review*, 4(4), 202–211. <https://doi.org/10.62843/jssr.v4i4.447>
- Adeyeye, S. V. & Oladokun, T. A. (2023) Application of emerging technologies for research support in Nigerian academic libraries: Trends, problems and prospects, *IASSIST Quarterly* 47(3-4), pp1-8. DOI: <https://doi.org/10.29173/iq106>
- Agbetuyi, P. A., & Isah, A. (2021). The Implementation of Emerging Technologies for Sustainable Academic Libraries: A Comparative Analysis between Developed and Developing Countries [Conference session]. Proceedings of the 2nd International Conference on ICT for National Development and Its Sustainability, Faculty of Communication and Information Sciences, University of Ilorin, Ilorin, Nigeria- 2021. <http://repository.futminna.edu.ng:8080/jspui/bitstream/123456789/6232/1/524-13-1799-1-10-20210312.pdf>
- Ajie, I. (2019). Information service provision by librarians in the era of globalization. *Library Philosophy and Practice (e-journal)*. Retrieved from <https://digitalcommons.unl.edu/libphilprac/2517>
- Arumuru, L. 2020. Re-Positioning The 21st Century University Libraries In Nigeria: The Role Of Librarians and The Need for Innovative Services for Sustainable Development. *Library Philosophy and Practice (e-journal)*. <https://digitalcommons.unl.edu/libphilprac/3936>
- Bawack, R. & Nkolo, P., (2018). Open access movement: Reception and acceptance by academic libraries in developing countries. *Library Philosophy and Practice*, pp.0_1-24. <https://core.ac.uk/download/pdf/188141049.pdf>
- Bichi, I. A. (2021). Leveraging emerging technology for public library service in Nigeria. *AI-*

Hikmah Journal of Educational Management and Counselling, Vol. 3 (1), pg?

- Calvert, Scout, & Mary L. Kennedy. (2020). "Emerging Technologies for Research and Learning: Interviews with Experts." 2020. <https://doi.org/10.29242/report.emergingtech2020.interviews>
- Das, A. & Banerjee, S., (2021). Optimising Research Support Services through Libraries: A Review of Practices. *Library Philosophy and Practice*, pp.1-43. <https://digitalcommons.unl.edu/libphilprac/5515/>.
- EDUCBA (2021). Data mining tool. <https://www.educba.com/data-mining-tool/>
- Hagiwara, Y., Ishita, E., Watanabe, Y. & Tomiura, Y. (2022). Identifying Scholarly Search Skills Based on Resource and Document Selection Behavior among Researchers and Master's Students in Engineering. *College & Research Libraries*, 83(4), p.610. <https://crl.acrl.org/index.php/crl/article/download/24257/33409>
- Library guides (2022). Tools for research: Research data management. (2022, March 2). Library Incomplete...Guides at University of Washington Libraries. <https://guides.lib.uw.edu/research/tools/rdm>
- Library guides: Tools for research: Research data management. (2022). Library Guides at University of Washington Libraries. <https://guides.lib.uw.edu/research/tools/rdm>
- Lubanga, S. & Mumba, J. (2021). Research and development (R&D), creativity and innovation in academic libraries in Malawi: A Way too rethink library development in the 21st Century. Retrieved from <http://dx.doi.org/10.2139/ssrn.3867430>
- Moruf, H.A. & Dangani, B.U. (2020). *Emerging library technology trends in academic environment- an updated review*. *Science World Journal*, 15(3), pp.13-18. <https://www.ajol.info/index.php/swj/article/view/202961>
- Okwoli, M.E., Whong, F. M., Ofodu, P. N. & Kajang, V. S. (2024). Exploring innovative technologies for enhancement of information dissemination by academic Librarians in Nigeria. Proceeding of the 62nd Nigerian Library Association Conference on promoting diversity and inclusiveness through innovative library and information service delivery in Nigeria. Port-Harcourt 7th -12th July, 2024. 206-270.
- Oluwasanu, M.M., Atara, N., Balogun, W., Awolude, O., Kotila, O., Aniagwu, T., Adejumo, P., Oyedele, O.O., Ogun, M., Arinola, G. and Babalola, C.P., (2019). Causes and remedies for low research productivity among postgraduate scholars and early career researchers on non-communicable diseases in Nigeria. *BMC research notes*, 12(1), pp.1-6. <https://link.springer.com/article/10.1186/s13104-019-4458-y>.
- Owolabi, K.A., Okorie, N.C., Yemi-Peters, O.E., Oyetola, S.O., Bello, T.O. & Oladokun, B.D., (2022). Readiness of academic librarians towards the use of robotic technologies in Nigerian university libraries. *Library Management*. Vol. 43 No. 3/4, pp. 296- 305. <https://doi.org/10.1108/LM-11-2021-0104>
- Princh Blogspot (2020). 10 innovative technologies to implement at the library of the future. Retrieved <https://princh.com/8-technologies-to-implement-at-the-library-of-the-future/YDDZV2ko-lv>
- Saibakumo, 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)*.5266. Retrieved from <https://digitalcommons.unl.edu/libphilprac/5266>
- Scout, C. & Kennedy, M.L. (2020). "Emerging Technologies for Research and Learning:

Interviews

with

Experts."

<https://doi.org/10.29242/report.emergingtech2020.interviews>

Vysakh. C (2020). Technology trends in the library: Transforming libraries: Smart users, smart Retrieved. *Lokoja Journal of Information Science Research*, 1:1