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MODERNIZING LIBRARY SERVICES IN THE DIGITAL ERA: NEW TRENDS AND USER-CENTRIC CHALLENGES

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Abstract

Purpose: *The study is on modernizing library services in the digital era: new trends and user-centric challenges.*

Methodology/Design/Approach: *Three research questions guided the study. The study adopted a survey research approach. Data were collected from 120 respondents including 10 library professionals, and 30 library users each from Anambra, Ekiti and Kogi states. Questionnaires were used to collect data. The instrument was subjected to validity and Cronbach Alpha reliability test which gave a reliability coefficient of 0.89. Mean and standard deviation was used to analyze the data.*

Findings: *The findings revealed a relatively high level of agreement among librarians regarding the impact of emerging technological trends on library services. There is a high level of consensus among librarians that emerging technological innovations are substantially reshaping user access to information. The users largely agree that they face significant user-centric challenges* such as insufficient ICT skills, poor infrastructure including internet issues, *and* limited technical support for troubleshooting.

Implication: *The study concludes that investment in digital infrastructure, capacity building, and strategic partnerships are essential for the successful transformation of library services.* ***Originality/Value:*** *The originality of the paper lies in its recommendation that libraries should expand their digital literacy programs to help users effectively navigate and utilize new technologies to access information*

Keywords: Library Services, Digital Age, Emerging Trends, User Experience, User-centric challenges

Introduction

The rapid advancement of digital technologies has fundamentally transformed the landscape of library services, ushering in new trends such as digital collections, remote access, virtual reference, and the integration of artificial intelligence, Internet of Things, and data analytics into library operations (Patil, 2024). These innovations have enabled libraries to transcend traditional

boundaries, offering users unprecedented access to information resources anytime and anywhere, and enhancing user engagement through personalized services and interactive platforms. However, the digital transformation of libraries is not merely about adopting new technologies; it also requires a fundamental rethinking of service models, staff roles, and user engagement strategies to ensure that technological advancements translate into meaningful improvements in user experience (Connolly et al., 2019). The proliferation of digital information has led to concerns about information overload, digital literacy, and the need for users to develop critical evaluation skills (Obiekwe & Agim, 2021). As libraries in diverse regions strive to modernize their services, they encounter both opportunities for growth and significant challenges related to resource constraints, staff training, digital preservation, and the ongoing need to protect user privacy and data.

Despite these advancements, user-centric challenges persist in the digital era. Many users face barriers such as limited digital literacy, difficulties navigating complex digital platforms, inadequate access to specialized e-resources, and disparities in internet connectivity (Chowdhury, 2024). These challenges are compounded by issues like information overload, insufficient user training, and the digital divide, which can hinder equitable access to library services and diminish user satisfaction (Muneja, 2024). Moreover, libraries must address the tension between offering personalized digital experiences and upholding core values such as user privacy and intellectual freedom (McGeary, 2019). Addressing these user-centric challenges requires continuous investment in staff development, infrastructure upgrades, and the design of intuitive, accessible digital services. The need to address these user-centric challenges is what formed the need for this study.

Statement of the Problem

In an ideal digital era, libraries would leverage cutting-edge technologies to provide seamless, personalized, and equitable access to information, empowering users with the skills and tools to navigate digital resources effectively. However, the current reality reveals significant user-centric challenges: many individuals struggle with information overload, insufficient digital literacy, and inequitable access to modern library services, leading to frustration and inefficiency. While libraries increasingly adopt technologies like AI-driven search tools, cloud-based platforms, and virtual reality, users often face barriers in utilizing these innovations due to a lack of training,

inconsistent infrastructure, and poorly designed user interfaces. Previous studies have focused on technological advancements in libraries but inadequately addressed the human-centered challenges of adapting to these changes, such as disparities in digital skills, accessibility gaps for marginalized groups, and the psychological impact of information overload. This gap underscores the need for a comprehensive investigation into how modernized library services can balance technological trends with user needs, ensuring inclusive and effective access to digital resources.

Objectives of the Study

The study on *"*modernizing library services in the digital era: new trends and user-centric challenges*"* aims to achieve the following objectives:

1. To examine emerging technological trends in library services.
2. To examine the impact of emerging technological trends on user information access
3. To explore the user-centric challenges faced by libraries in adopting and integrating digital technologies for users in the evolving digital landscape.

Review of Related Literature

Digital Transformation of Library Services

The digital transformation of library services represents a profound shift in how libraries operate and deliver information to users. This transformation is characterized by the integration of digital technologies into various aspects of library functions, including collection development, information organization, user services, and preservation (Agim, Irieguna & Chivuzo, 2023). Libraries are no longer confined to physical spaces but have evolved into hybrid models, offering both traditional resources and a wide array of digital content and services. This evolution has been driven by the increasing availability of digital resources, the changing information-seeking behaviors of users, and the need for libraries to remain relevant in an increasingly digital world.

The impact of digital technologies on library functions is multifaceted. Digitalization has enabled libraries to expand their collections beyond physical boundaries, providing access to e-books, online journals, digital archives, and multimedia resources. This has significantly enhanced user access to information, allowing them to retrieve materials anytime, anywhere (Igwe & Uzuegbu, 2013). Furthermore, digital

technologies have streamlined library operations, such as cataloging, circulation, and reference services, improving efficiency and freeing up staff time for more user-centered activities. The adoption of library management systems (LMS), online public access catalogs (OPACs), and discovery tools has also transformed how users search for and access information within library collections.

However, the digital transformation of library services also presents challenges. Libraries must address issues such as the digital divide, ensuring equitable access to technology and digital resources for all users (ALA, 2021). They also face the ongoing need to adapt to emerging technologies, such as artificial intelligence, machine learning, and blockchain, which have the potential to further transform library services. Additionally, libraries play a crucial role in promoting digital literacy and information literacy, helping users to effectively navigate the digital landscape and critically evaluate online information.

Impact of digital technologies on library functions

Digital technologies have revolutionized how libraries function, fundamentally altering traditional workflows and services. One of the most significant impacts is on collection development, where libraries have transitioned from primarily acquiring physical books and journals to curating diverse digital resources (Igwebuike & Agbo, 2015). This shift has expanded access to a wider range of materials, including e-books, e-journals, and online databases, making information accessible to users remotely and at any time. The emphasis has moved towards providing access to information rather than just ownership, with libraries increasingly relying on subscriptions and licenses for digital content.

Information organization has also been profoundly affected. The advent of digital technologies has led to the development of sophisticated library management systems (LMS) and online public access catalogs (OPACs). According to Mensah (2015), these tools have replaced traditional card catalogs, enabling users to search for and locate resources more efficiently. Metadata standards and digital cataloging practices have become crucial for ensuring that digital resources are discoverable and interoperable. Furthermore, digital technologies have facilitated the creation of digital libraries and repositories, providing access to digitized versions of unique and archival materials.

The way libraries deliver user services has also been transformed. Libraries now offer a range of online services, including virtual reference, online tutorials, and digital literacy programs. These services cater to the changing needs of users who increasingly expect to access information and support remotely. Digital technologies have also enabled libraries to personalize services, such as providing customized recommendations and alerts based on user preferences and research interests (Nitin, 2015). Libraries are also using digital tools to enhance user engagement, such as through social media, online communities, and interactive platforms.

Emerging Trends in Library Services

Libraries are continuously evolving to meet the changing needs of their users in the digital age. Several emerging trends are shaping the future of library services, driven by technological advancements and evolving user expectations. One prominent trend is the increasing adoption of artificial intelligence (AI) and machine learning (ML) to enhance library operations and user experiences. AI-powered systems are being used for tasks such as cataloging, information retrieval, and personalized recommendations, streamlining workflows and improving the efficiency of library services (Chukwueke & Onuoha, 2019). For instance, AI chatbots are being implemented to provide virtual reference assistance, offering users instant support and guidance.

Another key trend is the growing emphasis on enhancing digital literacy and providing robust online learning resources. Libraries are expanding their role as centers for digital literacy, offering workshops, training sessions, and online tutorials to equip users with the skills to navigate the digital landscape effectively (Agim & Azolo, 2019). This includes teaching users how to evaluate online information, use digital tools, and understand issues related to privacy and cybersecurity. Furthermore, libraries are curating and providing access to a wide range of online learning resources, such as MOOCs, open educational resources (OER), and digital repositories, supporting lifelong learning and academic research.

Emerging technologies like virtual and augmented reality (VR/AR) are also beginning to transform library services, offering immersive and interactive experiences for users. VR can create virtual library environments, allowing users to explore digital collections and attend virtual events from anywhere in the world (Pai & Parmar, 2014). AR can enhance the physical library space, providing users with additional

information and interactive content through their mobile devices. These technologies have the potential to revolutionize how users engage with library resources and create new opportunities for learning and discovery

Libraries' Role in enhancing effective services to users in the Digital Age

Libraries play a crucial role in enhancing effective services to users in the digital age by adapting to the evolving information landscape and addressing the challenges it presents. Libraries are instrumental in bridging the digital divide by providing equitable access to technology and digital resources. They offer computer access, internet connectivity, and digital literacy training to individuals who may otherwise be excluded from the digital world (ALA, 2021). This ensures that all members of the community, regardless of their socioeconomic status or background, can benefit from the information and opportunities available online.

Moreover, libraries serve as vital hubs for information literacy, empowering users to navigate the complexities of the digital information environment. They provide instruction and resources that enable individuals to develop critical thinking skills, evaluate the credibility of sources, and effectively locate and utilize information (Agim, Abah & Ezejiofor, 2025). By equipping users with these skills, libraries help them become informed and engaged citizens, capable of making sound decisions in their personal, professional, and civic lives. This role is particularly important in combating the spread of misinformation and promoting media literacy.

Furthermore, libraries are increasingly focused on protecting user privacy and ensuring data security in the digital age. They implement policies and technologies to safeguard user information, adhering to ethical standards and legal regulations (Storer, 2014). Libraries also educate users about their privacy rights and how to protect their personal data online. This commitment to privacy and security fosters trust and encourages users to utilize library resources and services without fear of compromising their personal information.

Methodology

The study used survey research approach. Data were collected from 120 respondents including 10 library professionals, and 30 library users each from Anambra, Ekiti and Kogi states. Questionnaires were used to collect data. The instrument was subjected to validity and Cronbach Alpha reliability test which gave a reliability

coefficient of 0.89. Mean and standard deviation was used to analyze the data.

Results and Discussion

Table 1: Emerging technological trends in library services

S/N	Item	Mean	Std. Dev.	Decision
1	Implementation of cloud-based library management systems	2.82	0.84	Agree
2	Adoption of mobile library applications for enhanced user access	2.90	0.79	Agree
3	Integration of artificial intelligence for reference and information services	3.18	0.76	Strongly Agree
4	Use of augmented reality (AR) and virtual reality (VR) for immersive library experiences	2.77	0.81	Agree
5	Deployment of chatbots for real-time virtual assistance	3.11	0.82	Strongly Agree
6	Utilization of blockchain technology for securing digital resources	2.74	0.86	Agree
7	Application of predictive analytics for user behavior and service planning	3.09	0.80	Strongly Agree
8	Expansion of open access and institutional repositories through digital platforms	2.88	0.78	Agree
	Grand Mean	**2.94**		**Agree**

From the table, it is clear that librarians agreed that several technological trends are reshaping library services, including the implementation of cloud-based library systems, adoption of mobile library applications, use of augmented/virtual reality, utilization of blockchain for securing digital resources, and *the* expansion of open access repositories. Meanwhile, respondents strongly agreed that the integration of artificial intelligence, deployment of chatbots for real-time assistance, *and* application of predictive analytics are significant and rapidly emerging technological trends. This suggests a general consensus that whiles all these technologies are important, AI, chatbots, and data analytics are seen as particularly transformative for library services. The grand mean of 2.94 shows a relatively high level of agreement among librarians regarding the impact of emerging technological trends on library services.

Table 2: Impact of emerging technological trends on user information access

S/N	Item	Mean	Std. Dev.	Decision
1	Greater personalization of information access through AI recommendations	3.20	0.75	Strongly Agree
2	Increased mobile access to library resources	2.85	0.82	Agree
3	Enhanced information retrieval speed with advanced search algorithms	3.17	0.78	Strongly Agree
4	Broadened user access to open access and institutional repositories	2.90	0.80	Agree
5	Improved user engagement through interactive digital platforms	3.09	0.79	Strongly Agree
6	Expansion of real-time assistance via AI-powered chatbots	2.91	0.77	Agree
7	Increased need for digital literacy among users to effectively navigate resources	2.88	0.84	Agree
8	Elevated expectations for 24/7 access to digital information services	3.11	0.81	Strongly Agree
	Grand Mean	**2.99**		

From the table, librarians agreed that emerging technologies have contributed to increased mobile access to resources, broadened access to open repositories, expansion of real-time assistance through AI chatbots, *and* increased need for user digital literacy. Meanwhile, librarians strongly agreed that greater personalization through AI, enhanced retrieval speed with advanced search systems, improved user engagement through digital platforms, *and* elevated user expectations for 24/7 access are significant impacts brought about by emerging technological trends. Overall, the results demonstrate a positive perception of the transformative influence of technologies on how users access information in academic libraries. The grand mean of 2.99 reflects a high level of consensus among librarians that emerging technological innovations are substantially reshaping user access to information.

Table 3: User-centric challenges in adopting and integrating digital technologies in the evolving digital landscape

S/N	Item	Mean	Std. Dev.	Decision
1	Lack of adequate funding limits digital technology adoption	2.93	0.78	Agree
2	Insufficient ICT skills among users hinders integration	2.88	0.81	Agree
3	Resistance to change among users	3.12	0.75	Strongly Agree
4	Poor infrastructure such as unreliable internet connectivity	2.91	0.77	Agree
5	High cost of maintaining and upgrading digital technologies	3.18	0.73	Strongly Agree
6	Limited technical support for troubleshooting digital systems	2.85	0.79	Agree
7	Privacy and data security concerns related to digital services	3.05	0.76	Strongly Agree
8	Rapid technological changes outpace library adaptation efforts	3.23	0.74	Strongly Agree
	Grand Mean	**3.02**		**Agree**

The table shows that users agreed that user-centric challenges such as lack of adequate funding, insufficient ICT skills, poor infrastructure including internet issues, and limited technical support for troubleshooting impact the adoption of digital technologies in libraries. Meanwhile, users strongly agreed that resistance to change among personnel, high cost of maintaining/upgrading digital technologies, privacy and data security concerns, and rapid technological changes outpacing library adaptation are more critical obstacles. This suggests that while structural and resource-related challenges are acknowledged, human-related factors, security, and technological volatility are seen as stronger barriers. The grand mean of 3.02 indicates that the users largely agree that they face significant user-centric challenges when trying to adopt and integrate digital technologies.

Discussion of Findings

In table 1, the findings indicate that while a wide range of technologies are being adopted to improve access, security, and user engagement, librarians view artificial intelligence, real-time virtual assistance, and predictive analytics as the most significant drivers of change within the modern library environment. These findings align with previous scholarly research. Agim, et al (2025) discussed the availability and utilization of ai-powered chatbots for enhanced user services, noting their significant contributions to enhancing real-time access to information. Similarly, predictive analytics is becoming increasingly important in academic libraries, helping to tailor services based on user behavior and improving strategic decision-making. In addition, Chukwueke and Onuoha (2019) reported that mobile applications, open access platforms, and cloud-based services have gained massive adoption among academic libraries aiming to improve user convenience and broaden global access to resources. Together, these studies reinforce the notion that emerging technologies are creating dynamic, responsive, and user-centered library environments.

In table 2, while all eight items show positive perceptions, the stronger agreement on AI-driven personalization, faster search processes, digital engagement, and expectations for 24/7 service indicates that users are not just accessing information more easily but are also demanding faster, smarter, and more interactive library services. These findings are supported by empirical studies in the field. Indraji, Naikar and Dominic (2024) demonstrated that academic libraries adopting mobile technologies and open

access platforms significantly improved the reach and ease of user information access. Similarly, they found that AI-driven search systems enhanced user satisfaction by offering quicker and more personalized information retrieval processes. In another study, Lund and Wang (2023) emphasized that users now expect seamless, always-available digital experiences, with libraries rapidly expanding 24/7 digital services to meet these rising expectations. Collectively, these studies affirm that technological trends are driving profound changes in user access patterns, preferences, and satisfaction levels in academic libraries.

In table 3, the most pressing user-centric challenges are related to poor skills, personnel attitudes, privacy/security concerns, and the rapid pace of technological change, while infrastructure, funding, and technical skills also remain notable barriers. This underscores the need for comprehensive strategies that address both human and technological factors for successful digital integration in libraries. The findings align with Storer (2014) who highlighted that inadequate funding and poor ICT skills among users are major setbacks to successful digital transformation in Nigerian academic libraries. Similarly, resistance to change coupled with the high cost of technological maintenance, severely hampers libraries' efforts to keep pace with digital innovation. Moreover, Pai and Parmar (2014) reported that privacy concerns and the rapid evolution of technology have placed continuous stress on library systems, demanding ongoing investment and training. Collectively, these empirical studies confirm that libraries must confront both systemic and user-centric challenges to thrive in the evolving digital environment.

Conclusion

In conclusion, the study reveals that librarians and users are well aware of the transformative impact of emerging technological trends on library services. They recognize the potential of AI, big data, and automation to enhance the user experience, but also acknowledge the significant user-centric challenges associated with the adoption and integration of these technologies. To effectively navigate the evolving digital landscape, libraries must adopt a proactive approach. This includes strategic planning, investment in technology, prioritization of user training, and a commitment to user-centric innovation. In a bid to addressing these challenges and implementing the recommended strategies, libraries can ensure their continued relevance and

enhance their ability to provide effective services to users in the digital age.

Recommendations

1. Libraries should encourage experimentation and the adoption of new technologies by providing users with the time and resources to explore and test emerging trends.
2. Libraries should expand their digital literacy programs to help users effectively navigate and utilize new technologies to access information.
3. Libraries should ensure that their online resources are user-friendly, accessible, and compatible with various devices and platforms.
4. Libraries should invest in AI-powered tools and big data analytics to personalize services, improve information retrieval, and automate routine tasks.
5. Libraries need to advocate for and secure sufficient funding to support the adoption and integration of digital technologies.
6. Libraries should provide ongoing training and professional development opportunities for users to enhance their digital skills and knowledge.

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