



IMPERATIVES OF DIGITAL LIBRARIES IN INFORMATION SERVICE DELIVERY IN ACADEMIC LIBRARIES

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Abstract

Academic libraries worldwide are increasingly embracing digital technologies as a means of improving information dissemination and service delivery. Consequently, many academic libraries are migrating from the traditional format to digital libraries in order to meet the demands of the 21st-century information age. The advent of technology has radically transformed the operations of academic libraries, making digital facilities central to effective information service provision. This revolution has prompted libraries and allied institutions to embark on digitization projects to enhance access, preservation, and global information sharing. Digital libraries now play a pivotal role in the information environment through the creation, organization, and utilization of digital resources. This paper examines the roles digital libraries play in information service delivery within academic libraries. It highlights the importance and objectives of digital libraries, the emerging role of digital librarians, and the major challenges such as inadequate funding, lack of skilled digital librarians, and obsolete technological facilities. The study recommends that academic libraries in Nigeria should be adequately funded to sustain digital projects and acquire up-to-date technologies. Continuous training and retraining of librarians in digital skills should be prioritized to enhance efficiency in service delivery. Furthermore, collaborative initiatives such as resource sharing, partnerships with ICT vendors, and adoption of open-source technologies are essential for overcoming infrastructural and financial barriers. By implementing these measures, academic libraries can strengthen their capacity to provide innovative, user-centered, and sustainable digital information services.

Keywords: Digital Libraries, Academic Libraries, Information Service Delivery, Nigeria



Introduction

A digital library is the generic term for federate structures that provide humans both intellectual and physical access to the huge and growing world-wide networks of information encoded in multimedia digital formats. Okocha, (2022) Digital libraries provide opportunities for African and developing countries to be abreast with current information, thereby bridging the knowledge gap. To engender progress in Africa Digital Libraries are non-negotiable for African Countries (UNESCO, 2006) .Prior to the advent of digital libraries, researchers and institutions in developing countries had limited access to articles published in developed countries due to high cost and challenges encountered in the distribution of these materials, but digital libraries has dispelled all these challenges making information accessible to all, currently universities around the world are migrating quickly towards digital libraries due to the increase in the development of these libraries (Bagudu and Sadiq ,2013).

According to UNESCO digital libraries play key roles in creating an atmosphere of learning in universities both for students and lectures. Hence, the need for the implementation of digital libraries is spurred from the challenges faced by traditional libraries. Narrowing the gaps between the Library and the user is very important in the information age as patrons become more particular on accessing information at their convenience, also based on the growing collections of materials there is a need to reduce the cost of purchase of materials and the cost of storage of these materials. In consideration of all these questions digital libraries has proven to be the answer to all these questions.

Sharma, Kumar, and Kumar, (2019) assert that digital library is an online database of texts, still images, audio, video and other documents in digital media formats. In addition to storage, digital library allow for organizing, searching and retrieving the contents. In digital library, the digital content may be stored and accessed locally and distantly through computer networks. Institutional repositories (IR) archives and digital library are needs of present scenario. The library patrons need the information which is preserved for research and academic purpose. New technologies develop and influenced the betterment of academic libraries and users.

Digitalization has also become an integrated part and routine work of the libraries and library professional. The above contributes to development of library activities, information services delivery, standardization, communication facilities, housekeeping operations to growing the variety of information needs of the end users. Digital library is now considered as a modern type of information retrieval systems. It is virtual in nature because its collections are stored in digital



formats and accessible with computers or mobiles devices anytime or anywhere. Such features have made the library defined the interchangeably used as virtual library, electronic library, e-library, institutional repository, i.e. library without walls, or digital library. Hence, the most appropriate and accepted word to such libraries is referred to as 'Digital Library'. Concerning to the above, Thanuskodi, and Sav, (2011) submit that, the major developments taking place in information palace today are the widespread and the availability and use of various type of electronic information resources.

The commonly available electronic resources such as CDROMS, OPAC, web databases, Internet, and numerous networked information resources are presently swapping the print based information sources that are as old as the library. The fast growth of ICT and particularly the Internet has changed the traditional methods of information services delivery which include research, storage, retrieval and communication of scholarly information. In the present dispensation, digital resources has emerged as the most powerful medium for storage and retrieval of information. In the electronic environment, librarians need to recognize that they are not the only one in distributing knowledge, that there are other actors that pose a threat to information services disseminations, therefore, the migration from the traditional concepts of service delivery to virtual services must be adopted now. Drawing from above, Yakubu, and Musa, (2023) posit that digital transformation and innovations has influenced contemporary societies in all sectors of life; such as social, political, economic, personal and professional spheres which also have an impact on the library. The 21st century is characterized by digital transformation and innovations. Today, digital technologies such as robotic technology, artificial intelligence, cloud computing, big data, social media, smart phones, digital cameras, sensors and Internet of Things (IoT) are contributing significantly in transforming global phenomenon in the areas of education, (library) commerce, health, agriculture, economy and telecommunication.

It should also be noted that, despite the critical role of digital transformation and innovations across the world, literature shows disparities between the developed and the developing countries which is referred to as digital divide (United Nations, 2017). While developed countries like Britain, the United States of America, Canada, France and Germany have harnessed the emergence of digital transformation and innovations to foster development, developing countries like Morocco, Liberia, Tunisia, South Sudan and Malawi still find it difficult to progress into a technology driven environment, global economy and knowledge-based. This assertion is justified by Igboechesi and Dang (2019) who postulated that digital libraries are by design made to be very involving; bringing about viability and productivity in enhancing knowledge and building capacity. They, however, observed that this is sadly not the exact reflection of the state of digital libraries in many academic



libraries in Africa, Nigeria in particular. They asserted that it is true and sad to mention that so many technological solutions fast penetrating into the library today resulting in digital service provision, some are yet to be realized in Nigeria, while some have been realized but their capabilities are not fully exploited. It is also unfortunate to note that most libraries in Nigeria cannot even afford proper and rout or digitized resources due to poor subvention from their funding fathers.

The cost of building digital libraries is still very high as leaders in developing nations in low economies focus on more political matters at the detriment of educations. Nevertheless, digital libraries in developing countries can be improved through a partnership between private institutions and funding agencies for sustainable funding, increasing the local content of digital publications, improving on infrastructural development in developing countries and investing in the training of library staff and users on digital libraries and literacy skills. Developing countries must leverage on its strengths so as to gain opportunities from the benefits of digital libraries. Isaias and Lamas (2017) depict that digital libraries (DL) are seen as the last option of developing countries in their struggle for accessing bibliographical resources, especially in a context where the traditional distribution mechanisms failed tragically.

Several difficulties are however faced by these countries to build and use digital libraries, due mainly to its high development cost and to the poor existing ICT resources in these countries. It is expedient to note that in these deplorable conditions of developing nations lagging behind, the world of information has forged ahead and tremendous results emanating from digital formats are benefiting information seekers who are exploiting the webs to satisfy their information desires. In the same vein, Ebhonu, Omosekejimi, and Dada, (2021) opined that academic library services have changed dramatically over the past decade with the aim of improving their performance in terms of their specialized functions and roles in the provision digital information services. The aim of these changes in services is to broaden the range of information resources available and to add value to their content by making them accessible through telecommunication networks so that users can access them anytime and anywhere. Through access to information, real-time communication, and virtual interactions, ICT transcends traditional constraints of time and space, offering opportunities for enriching and innovative users (Zawacki-Richter, (2019). To situate the discourse, Seadle and Greifeneder (2007) highlighted one of the best digital library definitions given by the National Science Foundation (NSF), USA in 1999. NSF defines digital library as, “store materials in electronic format and manipulate large collection of those materials effectively”.



A digital library is one that uses technology to search, gather, organize, store, and disseminate information, according to Irokwe (2001), as cited by Fadimu, George, and Asunmo, (2023) the aforementioned description demonstrates that a digital library's material is now considered to be the most practical means of giving customers quick, accurate, useful, and effective information services. With the availability of the internet, there are no longer any geographical or temporal restrictions on the movement of information. ICT has created what is known as the "global village." Libraries now stored digital information resources that are an essential element of helping patrons with learning, teaching, and research. In the light of these discourse, Igbo, Ibegbulam, Asogwa, and Imo. (2022) concludes that no library can expect to remain relevant should it continue to depend solely on the traditional mode of service provision characterised by physical interaction between the librarian and library user. The result is that, globally, libraries are responding by redefining their services to meet new expectations.

Some of the responses by libraries include the addition of a ubiquitous and networked environment as an extension of traditional library services, changes in the collections to include digital formats, changes in the method of delivery of services (to include online modes) using social media platforms, e-mail, chat services, among others. They continued, that application of technology in information provision is a child of necessity arising from the need to use technologies to enhance the availability and accessibility of information from different electronic resources and databases for human survival and development. Omekwu (2012) in his wisdom asserts that diverse kinds of the traditional library resources are now in digital or electronic format and this has created a new frontier for unlimited access to diverse kinds of literature. Hence, the term 'e-library' refers to information accessed through electronic sources like Internet. Unlike traditional libraries, e-libraries are not limited by location or time. Libraries have changed with the emergence and application of information technology (IT). Libraries have assumed the role of educators teaching users to find, evaluate and use information both in the library and over electronic networks. As the use of e-library continues to soar, users are expected to develop information literacy skill. It will be proper at this juncture to discuss the conceptually clarification of what digital libraries is as the above informed this paper.

Meaning of Digital Library

Digital libraries are institutions (or systems) that collect, store, organize, preserve, and provide access to digital content and associated services. These collections can include digitized items (books, manuscripts, images, etc.) and born-digital items (digital publications, audio, video, datasets) (Horsfall et al., 2021) They are not merely repositories; they also provide means for



search, retrieval, indexing, and often services analogous to those in traditional libraries (cataloguing, browsing, user support). One crucial feature of digital libraries is accessibility: users can reach materials remotely (over networks) at any time, without the need to physically go to a building. This helps broaden the user base geographically and temporally; learners, researchers, or the public can access content from different locations, time zones, or even under mobility constraints. Digital libraries also support preservation. Physical materials deteriorate, may be destroyed by disasters, and are fragile; digitization, redundancy, backups, migration of file formats, and similar strategies help preserve both rare and widespread content for the long term. In addition, digital formats enable richer media integration (audio, video, images) and richer interactivity (e.g. linking, annotations, data search) which are often impossible (or very difficult) in traditional print-only libraries (Tom-George & Nsirim, 2020)

However, there are also subtleties and debates about exactly what qualifies as a “digital library,” especially in terms of its structure, scope, ownership, and services. For example, recent scholarship has discussed whether a digital library is simply a digital repository, or whether it must include user services, networked access, policies, metadata standards, etc. There are policy, ethical, technological, and infrastructural challenges involved (copyright/licensing, file formats, sustainability, etc.). According to Fadimu, George, and Asunmo, (2023) the objectives of digital libraries includes:

- Storage and preservation of information
- Retrieval of stored information
- Use of digital technology in libraries
- Users interactions with digital materials
- Use of electronics resources and library services
- Digital environment in academic libraries
- Library professional practices and interactions with library patrons and
- Future of academic libraries and academic librarianship.

These and much more are the objectives of digital libraries which also form the importance of digital library.



Digital Library Services in Academic Libraries

Digital libraries (DL) are indispensable in information palace due to its functions. New technology has given rise to a new concept of modernization of academic libraries using digital technology and now going to become a part of daily work culture of under-developed the scenario says (Kude, (2013). Sinha, (2020) as cited in Magoi, and Echezona (2022) opined that DL are internet sites that focused on the creation and preservation of electronic books collections and holding of other kinds of materials without the need for the customers of the library purchasing the materials they want to access and read. DL also refers to, as a special library with a focused collection of digital objects that is stored in an electronic media formats. They submit thus, while traditional library staff perform their services manually throughout the library operations to meet patrons needs, the digital staff on their part, develop websites for getting information from different locations by providing links to resources. Consequently, based on the nature of Internet services provision, digital libraries have no physical boundary. These entails that library patrons have access to information anytime and anywhere (Okeke & Nsirim, 2024). The services of digital libraries according to Horsfall et al., 2021) include:

- ❖ OPAC to web PAC,
- ❖ Digital Reference Services,
- ❖ Library Chat Room,
- ❖ Electronic Delivery Services,
- ❖ Virtual Library Tours,
- ❖ Ask A Librarians,
- ❖ Real Time Services,
- ❖ Bulletin Boards,
- ❖ Web based User Education Web Forms,
- ❖ Frequently Asked Questions (FAQ),
- ❖ SDI in Digital Library Delivery Customized Services,
- ❖ RSS Feed.

They posit that each of these services is saddled with it software facilities for effective services delivery. Conforming to the above, DL is an innovative technology to develop the learning and new required skills for professionals to cope with digital libraries. Having dealt with the some of



the contribution of digital libraries in academic environment, it will be proper at this juncture to mention the roles which digital librarian offers for the actualization of service delivery in academic libraries, hence the roles of digital librarians.

Digital Librarians' Roles

Digital Librarians are referring to as system librarians/ system analyst that use Information Communication Technology to disseminate information through the following ICT tools like library services platform, remote access, cloud-based library services, marketing of library services through Blogs, Twitter, Facebook, LinkedIn, Instagram and other social networking tools (Okiji, 2014). Librarian provide information resources to users on electronic platforms. For example, ensuring availability of digitized information resources to library users in various format in the library Such as eBooks, e-journals. Magazines, Reference sources, audio-visual materials etc. System Librarian gives adequate training and education to other librarians on how they can go on digitization for effective services delivery to patrons, lectures and researchers in academic libraries. Academic libraries are referred to as libraries established in higher institutions of learning to support teaching, learning and research such as universities, polytechnics, monotechnics, College of Educations, school of preliminary studies. The aim of establishing these institutions are to provide up-to-date useful information resources from different format to supporting, teaching, learning and research. There are also charged to support the institutional curriculum through the acquisition of relevant and sufficient resource in their custody. Academic libraries have primarily responsible to their parent institutions by providing materials for teaching, learning and research for members of their immediate community as a matter of priority. The academic library is expected to be responsible for meeting the information needs of the entire university communities as part of their responsibility in fulfilling's the institutional mandate. In fulfilling this mandate, digital library play a vital role in academic libraries' information service delivery by providing access to information in a convenient and accessible format. The proliferation of information occasioned by advances in information technology has had a large impact on academic libraries (Mukred et al., 2019).

Odunlade, and Ojo, (2023) in their contributions submit that digital transformation otherwise referred to as web 4.0 is subsumed in the Fourth Industrial Revolution (4IR) which ushered in an increase in utilization of new technologies such as cloud computing, artificial intelligence, robotics, advanced wireless technologies, printing, Internet of Things (IoT), extensive information and research, online networks and others. The 4IR which is a fusion of digital, biological and physical words is characterised with Mobile App through the use of smart phones (Schwab, 2016).



In the library environment, digital transformation has revolutionized in-house routine and service delivery such that users can access adequate and current information promptly and remotely. Bradley (2018) submits that digital transformation in libraries may include provision of Kiosk based services, mobile based services, institutional repositories, multimedia contents, electronic information resources (books & journals), SMS services and so on. All these facilities has empowered the digital librarians to serve the users. The importance of digital transformation and innovations cannot be over emphasized. This is because it foster access to networked information resources such as bibliographic databases, remote library catalogues, bulletin boards, discussion groups, downloading remote files, acquiring software, ordering and subscription of online information materials and communication with other libraries (Ayoku & Okafor, 2015). Study conducted by Anunobi and Emezie (2016) indicate that digital transformation and innovations enhances quality access to digital collection of information resources is still a challenge in developing countries. In line to the above, this problem according to is due to poor penetration of digital technology in Africa.

Echezona et al. (2015) observed that lack of steady growth of online access to information to transform the whole concept of academic libraries into a global information-connected community is still a serious concern. Therefore, the provision of cutting-edge digital technology to transform library services facilitates research output among library users and access to information resources in academic library. Hanrong and Wang, (2014) analysed the impact of Internet and stated network technology in academic libraries in China and found great development and innovation and the latest development of reference services in academic libraries in mainland China by reviewing these services. Today, digitization in libraries has brought significant changes to all aspects of library services. Many libraries have replaced the card catalogue with open public access catalogues (OPAC). So digital resources are databases, books, journals, newspapers, magazines, archives, theses, conference papers, government papers, research reports, scripts, and monographs in a digital form that digital librarians exploit to service their patrons. Why digital services refers to the electronic delivery of information including data and content across multiple platforms and devices like web or mobile. Hence, digital library services refers to the electronic delivery of information including data and content across multiple platforms and devices like web or mobile etc.,.



Advantages Digital Libraries

The following are the advantages of digital libraries as stated by Hanrong, and Wang, (2014).

- Make a Wide Variety of Content Access.
- Latest and updated.
- Allow Readers to Access Materials on Demand
- Make Readers Find Resources Instantly
- No Opening or Closing Hours.
- Multiple and Simultaneous Access.
- Library Management Automation.

Real-Time Interactions

CHALLENGES

There are so many challenges affecting digital and academic libraries in developing countries. These have led to a wide gap in the way information is delivered with digital technologies. Some of the challenges identified are as follows:

Inadequate Funding and Budget Constraints

One of the most commonly cited challenges is the lack of sufficient funding to support the acquisition, deployment, and maintenance of digital library infrastructure. Digital services require investment in hardware (servers, computers, backup systems), software (licensing, subscription databases, digital rights management), and ongoing operational costs (internet bandwidth, power, maintenance). Without steady financial support, libraries struggle to sustain services, upgrade technology, or expand their digital collections (Okunlaya et al., 2022). For example, a study of academic libraries in Nigerian universities showed that poor funding severely limits the effectiveness of digital service delivery. Furthermore, budget constraints also affect staffing, training, and capacity building. Even if a library has some digital resources, lack of funds often means staff are not adequately trained to manage or exploit those resources, or there's no money for continuous user training, which undermines usage. In the research on Philippine academic libraries, funding was one of the barriers to long-term sustainability of digitization initiatives.

Technological Infrastructure and Power / Connectivity Issues



A second major challenge is inadequate or unstable technological infrastructure. This includes unreliable or low-bandwidth internet connections, insufficient or outdated hardware, lack of suitable storage and backup, and poor power reliability. These factors impair both library staff and users: slow or intermittent internet limits access to digital materials, poor hardware slows down services, and power outages can interrupt access or even cause loss or corruption of digital content. In Nigeria, several studies have noted frequent interruptions of electricity supply as a serious impediment to digital information provision. Connectivity issues also include lack of good networking internal to the library (LANs, WiFi), lack of remote access infrastructure, or lack of reliable digital platforms for reference services, repositories (Horsfall et al., 2021)

Lack of Digital Literacy

Even when digital resources are available, human capacity is often a bottleneck. Librarians and information professionals sometimes lack the specialist skills needed for managing digital collections, repositories, metadata, digital preservation, and for assisting users with digital tools. Additionally, users (students, faculty) may have low levels of digital literacy, which means they cannot fully use or discover the digital services provided. In Nigeria, studies have reported poor staff skills in applying digital resources and services, as well as ICT illiteracy among both staff and users. This lack of expertise also leads to other problems: for example, metadata inconsistencies, poor platform usability, inefficient workflows, and higher risk of data loss or mismanagement (Nsirim & Okeke, 2024). Without ongoing professional development and training, the gap between what users expect and what digital libraries can deliver widens. The e-resource management literature in India has also emphasized that lack of professional skills is a key factor in challenges managing e-resources effectively.

Technological Obsolescence

A fourth challenge is ensuring the long-term preservation of digital resources and having policies to guide that. Digital content is subject to risks: storage media degradation, file format obsolescence, software, hardware and platform changes, and security vulnerabilities. Without proper digital preservation strategies (migration, refreshing, replication, emulation, backups), many digital assets may become unreadable or lost. Technological obsolescence, storage media degradation, and lack of preservation policy were all identified as serious issues. Additionally, policies and institutional frameworks to guide digital library operations are often weak, missing, or inconsistently enforced. This includes policies on copyright/licensing, digital rights management, open access, user data privacy, metadata standards, etc. (Tom-George & Nsirim, 2020). For example, in the Nigerian context, lack of formal policy on digital information service was one of the strongly agreed challenges in provision of digital resources



Even when digital services are in place, users may not be fully aware of them, or may lack physical or technological means to access them. This includes lack of access to appropriate devices (computers, smartphones), limited internet at home or off-campus, low digital literacy, or lack of awareness of what services or resources exist. Limited access to internet services and ICT devices among students was a major barrier to accessing library information resources. Equity issues also surface: services might not be accessible to those with special needs, or remote users may be marginalized (Armah, & Cobblah, 2021). There may also be bureaucratic or organizational barriers: cumbersome policies, non-user-friendly platforms, licensing restrictions, etc., that limit who can use what resources and how. In the survey of South-South universities in Nigeria, a challenge was “non utilization of digital library Apps by persons with special needs” and “lack of awareness on digital library apps that can be used for effective digital service delivery.”

Conclusion

Digital libraries have become indispensable in enhancing information service delivery in academic libraries, providing efficient access to diverse and vast information resources regardless of time and location. The transformation from traditional to digital platforms has redefined the roles of academic libraries, positioning them as active players in the global information environment. Despite challenges such as inadequate funding, lack of skilled personnel, and obsolete technological facilities, digital libraries remain a vital tool for knowledge dissemination, preservation, and academic advancement. For academic libraries in Nigeria and other developing contexts, embracing digital libraries is not optional but a necessity for meeting the dynamic information needs of students, researchers, and faculty members. Strengthening funding mechanisms, upgrading technological infrastructure, and investing in the training of digital librarians are critical steps toward sustaining these innovations. Ultimately, the effective integration of digital libraries will not only improve service delivery but also ensure that academic libraries remain relevant, accessible, and impactful in the 21st-century knowledge society.

Recommendations

1. Government and university management should provide sufficient financial support for academic libraries to acquire modern ICT infrastructure, subscribe to relevant electronic databases, and maintain sustainable digital library services.
2. Regular training and retraining programs should be organized for librarians to enhance their digital literacy, technical competencies, and ability to manage and deliver effective digital information services.



3. Academic libraries should invest in up-to-date technological facilities, reliable connectivity, uninterrupted power supply, and user-friendly digital platforms to ensure seamless access to information resources.
4. Academic libraries should engage in partnerships with other libraries, ICT vendors, and consortia to share resources, adopt open-source digital library solutions, and maximize the use of limited funds and infrastructure.

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