

## **DIGITAL TRANSFORMATION AND ACADEMIC LIBRARIES: EXPANDING ACCESS TO PRINT AND ELECTRONIC RESOURCES**

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### **INTRODUCTION**

Prior to the advent of Information and Communication Technology (ICT), academic libraries were regarded as the primary—and almost exclusive—custodians of knowledge and information wealth. At that time, the majority of information was available in printed form, and libraries served as the principal means of acquiring knowledge. However, the rapid evolution of information resources has brought about significant changes in the conventional systems for the organization, presentation, preservation, and dissemination of such resources. The innovative digital packaging of information, electronic publishing, and network-based communication have fundamentally transformed the operational dynamics of academic libraries.

In the current era, academic libraries must effectively manage both types of hybrid resources. Furthermore, librarians and information professionals need to acquire innovative technical skills, digital information management expertise, and information literacy competencies. The increasing availability of electronic information resources has also shifted the traditional mindset that libraries were the sole means of acquiring knowledge. Users can now access information through the internet, digital repositories, online databases, and Open Access platforms.

Nevertheless, academic libraries have succeeded in maintaining their relevance because they function as institutions that provide organized, equitable, and continuous access to both print and digital materials. In the digital age, libraries are evolving from mere repositories of information into multifaceted hubs dedicated to knowledge curation, information management, research support, and the preservation of intellectual resources.

The present research paper examines the nature of academic libraries in the digital age. It provides a comprehensive analysis of information resources, the principle of "Universal Access," and the role of libraries in ensuring equal and extensive access to both print and electronic resources. Furthermore, this study presents a conceptual model for resource access in academic libraries within developing countries, designed with due consideration for contemporary requirements regarding information accessibility, technological infrastructure, and knowledge dissemination.

### **ACADEMIC LIBRARIES IN THE DIGITAL AGE**

A well-organized and robust library is considered to play a critical and indispensable role within the educational, intellectual, and research infrastructure of any academic institution. Academic libraries are expected to provide users with high quality, authentic, and

standardized information resources, as they serve as the fundamental pillars of teaching, learning, and research activities. However, in today's digital world, academic libraries face a continuous struggle to maintain their relevance as primary sources of knowledge and information.

Digital technology has transformed the traditional systems of information collection, structuring, resource processing, preservation, and dissemination. Moreover, it has completely altered user behavior regarding both information access and information discovery. Users are no longer solely dependent on library-centric sources to acquire information; they now access the Internet, digital databases, online repositories, e-journals, e-books, and other network-based resources quickly and effortlessly. Consequently, academic libraries need to restructure their traditional roles and services.

Academic libraries were formerly limited solely to functions such as collection development, classification, cataloging, circulation, reference services, current awareness services, selective dissemination of information (SDI), and other bibliographic services. However, in today's digital era, their scope of operations has become vastly broader and more diverse. Interdisciplinary studies, computer hardware and software, information networking, telecommunications engineering, and digital information management are now integral components of library operations.

Campbell (2006:17) observed that the digital era has witnessed the development of numerous innovative and valuable services within academic libraries, including the provision of high-quality learning spaces, metadata creation, virtual reference services, information literacy instruction, resource selection and license management, and the collection and digitization of archival materials. This assertion clearly demonstrates that modern academic libraries have evolved beyond being mere repositories of information; they have transformed into dynamic hubs for knowledge management and digital learning.

Currently, the challenge confronting academic libraries is not merely a question of which books and research journals to acquire in order to satisfy the needs of students and faculty members; a far more critical question is how to sustain their utility and relevance in the digital age. Furthermore, library users are increasingly gravitating toward alternative—and often more rapid, convenient, and ostensibly "superior"—sources of information, particularly the Internet. According to Lombardi (2000), users now place increasing value on access to computerized materials, online indexes, digitized search aids, digital article repositories, newspapers, and various other information resources.

This is why the process of digitization raises numerous complex questions for academic libraries—such as when it will be initiated, how it will be executed, who will be responsible for it, and at which institutional level it will be implemented. Furthermore, if there is excessive delay or hesitation in digitizing institutional archival material, this responsibility may be transferred to an external institutional repository or another digital platform. Such circumstances could impact the resources, as well as the traditional roles and scope of work, of academic libraries.

Consequently, in today's digital world, it is imperative to reconfigure the resources, services, operational procedures, and professional skill sets of academic libraries. Today, information is available in both print and electronic formats; libraries and information science professionals are expected to possess technical proficiencies, digital management capabilities, and modern information services commensurate with a hybrid information environment, enabling them to effectively meet the evolving needs of users.

## UNIVERSAL ACCESS TO RESOURCES

Traditionally, libraries have served as key access points for providing entry to knowledge and information resources. Library services and information access systems have undergone significant transformation and evolution. The journey—spanning from the closed-stack system to shelf-browsing, card catalogs, punch-card systems, and the Online Public Access Catalog (OPAC)—has ultimately given rise to modern concepts such as "Open Access" and "Institutional Repositories" (Cisse, 2004). This historical transformation was driven by the need to meet the changing demands of library users. These demands include quick and easy access to information, greater interactivity, minimal intermediation, and the availability of information resources at a lower cost.

Eisenberg (1990) asserted that effective access to information resources is of greater importance than ownership. The fundamental objective underlying this perspective is to ensure that information resources are physically accessible from any location—whether in workplaces, dormitories, classrooms, or within home premises. Thus, the concept of information access has rendered geographical boundaries and physical barriers far less significant.

Academic libraries have undertaken significant efforts to embrace digitization and automation, recognizing the evolving standards for access to information. For instance, Nigeria's Federal Ministry of Education and other funding bodies launched a "Virtual Library Project." Its objective was to electronically integrate the resources of various academic libraries and interconnect them within a shared network. The National Universities Commission served as the focal point for this project (Federal Ministry of Education, 2000). Participating libraries in such projects provide access to global information resources.

Academic libraries subscribe to numerous electronic portals and databases, whether through independent subscriptions or via a library consortium. For example, the Nigerian University Libraries Consortium (NULIB) has subscribed to EBSCOhost. Furthermore, academic libraries have established gateways providing users with access to various global information portals—such as "Access to Global Online Research in Agriculture" (AGORA), "Health InterNetwork Access to Research Initiatives" (HINARI), "Online Access to Research in the Environment" (OARE), and the "African Digital Library" (ADL).

Crow (2002) noted that institutional repositories are digital collections dedicated to the collection, preservation, and dissemination of intellectual and research outputs. Institutional repositories not only help reduce the costs associated with scholarly publications but also enhance the visibility, accessibility, and impact of research work produced by faculty members and students. These repositories encompass teaching materials, research papers, technical reports, conference proceedings, theses and dissertations, and other academic documents, which are archived and made available on the websites of the respective institutions, professional organizations, or third-party service providers.

In essence, institutional repositories serve as digital "mirror images" of printed institutional archives. In many academic institutions, these repositories are managed and preserved by the libraries. In the digital age, the role of libraries has rendered institutional repositories more technologically sophisticated—a departure from the past, when their function was primarily limited to providing access to printed archival materials. Libraries are now required to undertake advanced tasks such as metadata standardization, metadata harvesting, interoperability, and digital preservation.

Today, the libraries of numerous universities have made significant contributions to institutional repository initiatives. The following are key examples—

- **Academic Research in the Netherlands Online (ARNO) Project** — This project commenced in September 2000 and was implemented by library staff from the University of Twente, the University of Amsterdam, and Tilburg University.
- **DSpace Project** — This is a joint venture between the Massachusetts Institute of Technology (MIT) Library and Hewlett-Packard.
- **‘Knowledge Bank’ of Ohio State University** — Which was developed for the preservation and dissemination of institutional knowledge resources.
- **Utrecht University's Institutional Repository** — Which is an excellent example of the digitization of university research and academic material.

The library staff at the University of Jos have also made significant contributions toward ensuring the digitization of Nigeria's academic institutions and universal access to information. In the contemporary era, the responsibility of academic libraries is no longer limited merely to the collection of information resources; they must now also enhance the academic identity and reputation of their institutions while catering to the diverse needs of their users. To ensure the democratization of knowledge and equity in information access, academic libraries must be provided with appropriate, balanced, and universal access to both types of resources.

### **A Conceptual Model for Access to Print and Electronic Resources in Academic Libraries**

The aforementioned circumstances clearly indicate that contemporary academic librarians must ensure equitable, coordinated, and effective access to both traditional print and modern electronic information resources. A survey conducted across the libraries of federal universities in Southern Nigeria revealed that these libraries are grappling with the challenge of striking a balance between traditional and digital information environments. Consequently, Figure 1 presents a conceptual model designed to guide academic libraries through this transitional information landscape.

This model is fundamentally based on two major information access environments:

1. Internal, Local, or Autonomous Access Environment
2. Universal, Global, or Integrated Access Environment

### **Three Options within an Internal or Independent Access Environment**

Figure 1 outlines three alternative frameworks for information resource management and access in academic libraries—

#### **(A) Electronic Resource Unit (E-Resource Unit)**

This option is entirely electronic in nature. It features a robust supportive infrastructure comprising appropriate software, high-capacity hardware, networking facilities, and trained human resources. Users of an academic library can access digital databases, e-journals, e-books, online repositories, and other electronic resources through this unit.

### **(B) Integrated Print and Electronic Resource Unit (Integrated Print and E-Resource Unit)**

In this option, a balanced management of both digital and print resources is maintained. It, too, is equipped with a supportive technical infrastructure that enables users to avail themselves of modern electronic services alongside traditional library services. This model strikes a balance between traditional and digital information cultures; therefore, it is highly beneficial for libraries currently undergoing a transition.

### **(C) Print Resource Unit (Print Resource Unit)**

This option is based on a traditional library structure, primarily comprising reference materials, printed books, research journals, and other physical resources. Within this unit, users receive traditional library services, and the necessary supportive environment is also available.

Currently, all three of the aforementioned options are widely available in many academic libraries across Nigeria. While these models are adequate for meeting local information access needs and traditional library requirements, they fall short of fulfilling the expectations for comprehensive and universal information access associated with modern academic libraries of global standards.

## **UNIVERSAL OR INTEGRATED ACCESS ENVIRONMENT**

The second aspect of the proposed model is the Universal Access Environment. Essentially, this constitutes an electronic consortium or a shared information network. A feedback mechanism links the Print Resource Units, the Integrated Print and E-Resource Units, and this specific environment. The Central Library Server serves as the operational hub for all these units. This central server provides information and services from various resource units, comprising high-capacity hardware, advanced software, and telecommunications infrastructure. Each unit is capable of establishing access to the server, while the server itself is also made universally available over the Internet via an Online Public Access Catalog (OPAC). Library users are not confined to local areas but gain access to worldwide information resources.

**Academic libraries**—whether operating in independent environments or otherwise—are facilitated by this integrated access to become part of a global information-sharing system. Through this, libraries can ensure access to global knowledge resources, whether with or without the direct participation of the originating institutions.

### **Emerging Issues for Academic Libraries in Developing Countries**

The greatest challenge currently facing academic libraries in developing countries is the need to move beyond local, traditional, and limited models of information access to transition toward universal and global information access. This transformation is essential for maintaining institutional relevance and academic significance.

According to Tebbetts (1991), to achieve this objective, academic libraries must possess the attributes of scalability, flexibility, and adaptability. Furthermore, the following components are required to ensure the success of a digital library system:

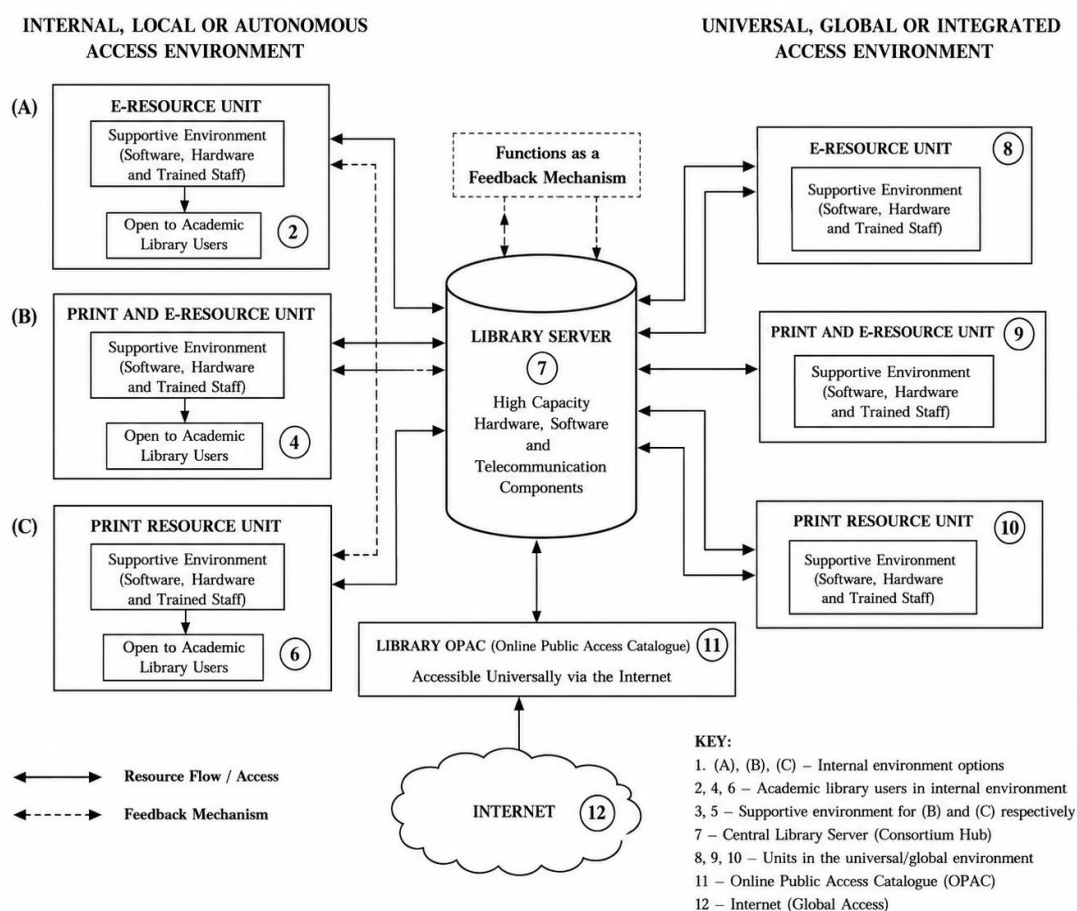
- Standardized and high-capacity hardware;
- Adequate networking and telecommunications infrastructure;
- Flexible and advanced software;



- Standards such as MARC (Machine Readable Cataloguing) for information storage and retrieval;
- Local technical expertise;
- And long-term strategic planning for the development of future information systems.

Indeed, in today's digital era, academic libraries are no longer merely institutions for information storage; they have also become vital conduits for knowledge preservation, information sharing, digital learning, and the establishment of global intellectual connections. Developing countries must transform their academic libraries into active hubs of the knowledge society by integrating them with modern technology, trained human resources, and global information networks.

**Figure 1: Conceptual Model for Access to Print/Electronic Resources**



The paradigm comprises two distinct access environments: the universal, global, or integrated access environment and the domestic, regional, or autonomous environment.

## EMERGING PROBLEMS FOR DEVELOPING COUNTRY ACADEMIC LIBRARIES

Academic libraries must switch from limited or local access to universal access if they want to continue being important in their institutions | Expandability, flexibility, and compatibility are necessary for the development of academic libraries to achieve this (Tebbetts 1991) | It requires standard hardware, sufficient capacity, networking capabilities, flexible software,

local expertise, MARC information storage and retrieval standards, and a plan for the subsequent system I

## CONCLUSION

The emergence and widespread development of Information and Communication Technology (ICT) have completely transformed the traditional resources, methodologies, structures, and service paradigms of academic libraries. Concurrently, the expectations of library users—as well as their methods of acquiring information and their trends in utilizing knowledge—have undergone significant changes. Previously, library users had to physically visit the library to access information resources, consult card catalogs, and search the bookshelves for necessary materials; however, in today's digital era, this traditional practice has become nearly obsolete. This shifting trend is also rapidly permeating the academic environments of developing nations.

In the contemporary information society, people expect information services that are instantaneous, remote, interactive, and technology-driven. Consequently, academic libraries can no longer remain confined to traditional print resources; instead, they must align their structures, services, and technical capabilities with the demands of digital and hybrid information environments. The print/electronic resource access model presented here can serve as a transitional framework—or a "ladder"—for academic libraries, enabling them to evolve from providing localized information services toward facilitating universal and global information access.

Nevertheless, to ensure the long-term success of such transformations, academic libraries must consistently adhere to certain key principles. Library systems, in particular, require scalability, flexibility, and adaptability so that they may evolve to meet the challenges posed by future technological advancements, changing user requirements, and the ever-evolving global information landscape.

For this very reason, in today's digital age, the true significance of academic libraries lies not in the extent of their physical collections, but rather in their capacity to make knowledge and information accessible in a coordinated, reliable, and universally available manner. Academic libraries will be able to successfully sustain their significant and indispensable role in the future knowledge society only if they appropriately restructure their resources, services, and professional skills by adopting timely technological innovations.

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