

Libraries without Borders: An analysis of global changes, challenges and new opportunities in library and information science

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ABSTRACT

The rapid advancement of information and communication technologies has transformed library and information science from traditional print-based services into globally connected knowledge systems. Libraries without borders now integrate digital repositories, electronic resources, cloud computing, open access, artificial intelligence, virtual reference services, data management, and resource-sharing networks to provide equitable access beyond geographical, temporal, linguistic, and socioeconomic barriers. This study analyses global changes, challenges, and opportunities in library and information science through document analysis and descriptive and analytical methods, using official and scholarly sources. Emerging technologies offer significant opportunities through AI, digital preservation, multilingual information retrieval, and virtual services. However, the digital divide, copyright, privacy, cybersecurity, AI bias, misinformation, linguistic disparities, and changing professional skills remain major concerns. Despite 68% global Internet connectivity in 2024, 2.6 billion people remained offline, highlighting persistent inequalities. The study concludes that libraries without borders must remain inclusive, ethical, multilingual, and rights-based, while librarians increasingly serve as information evaluators, digital and AI literacy educators, research supporters, privacy advocates, and knowledge mediators.

Key Words: Libraries without borders, library and information science, digital library, artificial intelligence, open access, information literacy, digital divide, digital transformation.

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INTRODUCTION

The library is one of the most important social and educational institutions for preserving humanity's accumulated knowledge. Its evolution from ancient manuscript collections to modern digital repositories is not merely a story of technological change; it is also a story of the transformation of information formats, knowledge ownership, user expectations, and the role of information in society.

In a traditional library, access to information was constrained by factors such as physical location, the library's age, available collections, and the number of copies held. Digital technology has radically transformed these limitations. With the advent of e-books, e-journals, online databases, digital theses, institutional repositories, and virtual reference services, users can now access information without being physically present in a library building.

This transformation can be described as a "library without borders." However, the term "without borders" does not imply a system entirely free of boundaries. In fact, copyright, licensing, language, digital access, financial resources, and technological capabilities create new borders. Therefore, it is more appropriate to conceive of the library without borders as a knowledge system that reduces physical barriers while simultaneously managing new digital, legal, and social boundaries.

According to the IFLA Internet Manifesto 2024, the Internet and the information landscape are also linked to human rights, equitable access to information, inclusion, and accountability. This perspective imbues the concept of the library without borders with not only a technological dimension but also social and ethical ones.

Inequality is also evident in the global digital landscape. According to the ITU, an estimated 5.5 billion people worldwide were connected to the Internet in 2024, yet 2.6 billion remained offline. In high-income countries, 93% of the population used the internet, whereas in low-income countries, this figure was only 27% (International Telecommunication Union).

Consequently, the issue of a "library without borders" goes beyond the question of "how do we build a digital library?" The fundamental question is: how can digital transformation be turned into equitable, reliable, secure, and inclusive access to knowledge?

RESEARCH PROBLEM

Digital transformation has increased the availability and accessibility of information for libraries, but it has also created new complexities. Issues such as digital content licensing, copyright restrictions, platform dependency, privacy concerns, algorithmic bias, and AI-generated misinformation were relatively uncommon in traditional library services. Therefore, due to the digital divide, the "online library" is not equally accessible to everyone. ITU statistics show that in 2024, 83% of the global urban population used the internet, whereas this figure was only 48% in rural areas (International Telecommunication Union). The fundamental research problem is, therefore: how can libraries amidst constant technological evolution become truly borderless, equitable, and people-centred spaces?

SCOPE OF THE RESEARCH

This study primarily covers the following dimensions:

- Digital transformation

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- The concept of the library without borders
 - Artificial intelligence and automation
 - Open access and open science
 - Information literacy and artificial intelligence
 - Digital divide
 - Privacy and data security
 - Copyright and digital licensing
 - The changing role of library and information professionals
 - Global collaboration and resource sharing
 - The digital library landscape in India

RESEARCH OBJECTIVES

The main objectives of this study are as follows:

- 1) To develop a conceptual understanding of library without borders.
- 2) To analyze the global digital transformation in library and information science.
- 3) To identify the role of AI and other emerging technologies.
- 4) To analyze issues regarding the digital divide and information inequality.
- 5) To evaluate challenges related to copyright, licensing, privacy, and AI ethics.
- 6) To identify the new competencies required for library and information science professionals.
- 7) To understand the role of open access and open science.
- 8) To understand the development of India's digital library within a global context.
- 9) To present a conceptual framework for the library without borders.
- 10) To present policy and practical proposals for the future.

RESEARCH QUESTIONS

This study is based on the following research questions:

- Q1: What are the key conceptual characteristics of the library without borders?
- Q2: How are digital technologies transforming library services and the library and information science profession?
- Q3: What new opportunities and ethical risks does AI pose for the library without borders?
- Q4: How does the digital divide affect the concept of the library without borders?
- Q5: How can open access, resource sharing, and digital repositories contribute to global access to knowledge?
- Q6: What new competencies will be required for future library and information science professionals?
- Q7: What are the opportunities and challenges for India within the global landscape of libraries without borders?

LITERATURE REVIEW

The nature of digital library research has changed significantly over the last two decades. According to a systematic textual analysis by Andro and Maisonneuve, digital library research has moved beyond traditional discourses on preservation and national libraries to encompass topics such as open access, academic libraries, and user relations. Their study characterizes the evolution of digital library literature as a tradition moving toward maturity (Andro and Maisonneuve).

The evaluation of a modern digital library is not based solely on the quantity of digital documents. Access, search ability, usability, interoperability, and user experience are now also key dimensions.

In a recent study regarding the context of AI in India, Rajarshi demonstrated a positive trend toward AI adoption among library and information science professionals. However, the study also highlights the need for technical, analytical, and ethical competencies, as well as specialized training and infrastructure investment (Rajarshi).

In 2025, IFLA published the document "Entry Point for Libraries and AI," which provides library professionals with practical questions and a framework for evaluating the benefits of AI, as well as its ethical and social risks. In IFLA's view, privacy, openness, accountability, and freedom of expression are crucial ethical considerations regarding the use of AI.

The 2021 UNESCO Recommendation on Open Science provides a global framework for making scientific knowledge more accessible, inclusive, and reusable. It emphasizes open access to publications, data, educational resources, software, and open infrastructures (UNESCO).

A systematic review on information literacy has also suggested that, in the digital age, it is not enough for an individual simply to find information; they also require the ability to critically evaluate, interpret, and effectively communicate it (Chourio-Acevedo et al.). An important point emerges from this literature: research on digital libraries is shifting from a technology-centred approach to a human, ethical, and social one.

Research Gaps

There is a varying amount of research available in current literature on topics such as digital libraries, AI in libraries, information literacy, and open access. However, studies linking all these dimensions under a unified conceptual framework termed the "Library without Borders" are relatively scarce. From the above review of literatures, the following research gaps are observed:

- **The gap between technology and equity:** Many studies highlight the benefits of AI and digital technologies, yet there is less integrated analysis regarding the relationship between technology adoption and equitable access.
- **The distinction between "digital access" and "meaningful access":** Having an internet connection does not guarantee the effective use of information. Factors such as the device used, affordability, digital literacy, language, and accessibility are also crucial. ITU statistics highlight this inequality.
- **Integration of ethical approaches in AI:** AI research focuses on automation and efficiency, whereas the integration of privacy, copyright, algorithmic bias, transparency, and human oversight with library values remains an area in development.

- **Indian languages and local knowledge:** Global literature on digital libraries is dominated by English and other major languages. Further research is needed on how to incorporate Indian languages, local knowledge, oral histories, and culturally sensitive collections into a borderless digital knowledge ecosystem.
- **Professional transformation in Library and Information Science:** With the advent of AI, a more important question than "Will the librarian's job disappear?" is "In what new directions will the professional identity of librarians evolve?" This transformation must be studied alongside competencies, ethics, and lifelong learning.

RESEARCH METHODOLOGY

This study is based on a qualitative approach that is descriptive, analytical, and document-based.

- **Primary sources:** Official documents from international and national organizations were used as primary sources. These include IFLA documents regarding AI, the Internet, privacy, and copyright; the UNESCO Recommendation on Open Science; the ITU report (Facts and Figures); as well as official documents concerning digital libraries and electronic resources in India.
- **Secondary sources:** Secondary sources include peer-reviewed journal articles, systematic reviews, academic papers, and literature on library and information science. Specifically, research on digital libraries, AI in academic libraries, information literacy, and digital transformation was analyzed.
- **Analysis methodology:** Through thematic coding of the literature, the following main themes were identified:



Based on this thematic analysis, a conceptual framework for a library without borders is presented.

ORIGINAL CONTRIBUTION OF THE STUDY

The original contribution of this research lies in presenting the "Library without Borders" not merely as a digital library, but as a knowledge system comprising seven interconnected dimensions:

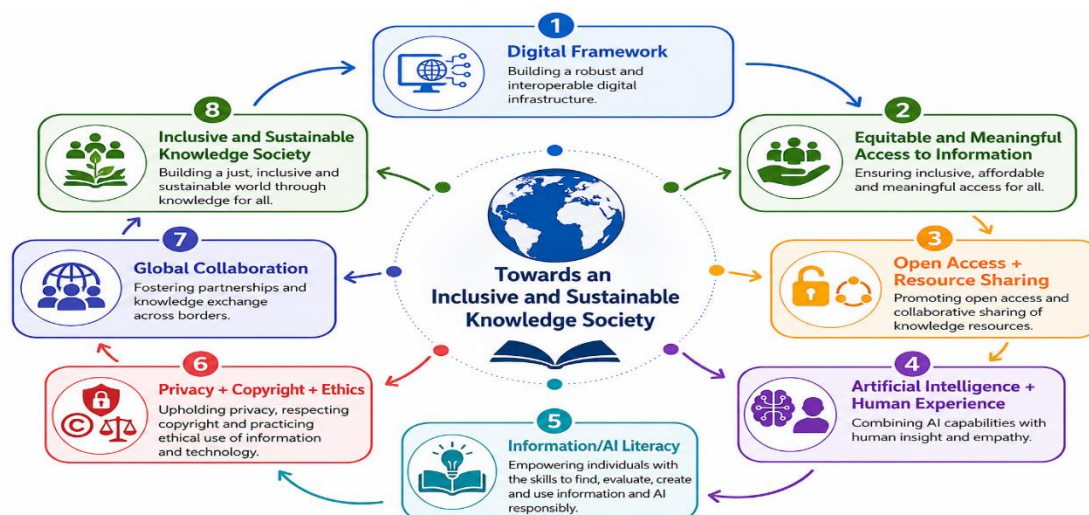
- a) Digital infrastructure
- b) Universal and meaningful access
- c) Open knowledge
- d) Human intelligence and AI

- e) Information literacy and AI
- f) Rights, ethics, and privacy
- g) Global collaboration and sustainability

The absence of any of these dimensions from this framework diminishes the effectiveness of Library without Borders.

CONCEPTUAL FRAMEWORK FOR THE LIBRARY WITHOUT BORDERS

“Library without Borders Ecosystem Model”



The basic premise of this model is that technology is the medium, information is the resource, the librarian is the knowledge mediator, and the user is the focal point.

GLOBAL TRANSFORMATION IN LIBRARY AND INFORMATION SCIENCE

- **From print to digital and hybrid models:** The digital age has not eliminated the importance of print collections. Instead, a hybrid library model has evolved, in which both print and electronic resources are available based on user needs.
- **Cloud-based and networked libraries:** Cloud-based library systems have enabled the integration of cataloguing, authentication, circulation, analytics, and search services. Consequently, the local library structure is transforming into an ecosystem of networked services.
- **Digital repositories:** Institutional repositories store and provide long-term access to research articles, theses, dissertations, datasets, and other scholarly outputs.
- **Virtual services:** Library services are becoming independent of the user's physical location through email and chat reference services, online tutorials, video consultations, and digital research guides.

ARTIFICIAL INTELLIGENCE AND THE BORDERLESS LIBRARY

AI could be one of the most transformative technologies for the borderless library. Its potential uses include:

- Semantic search
- Natural language information retrieval

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- Automatic metadata generation
 - Classification assistance
 - Recommendation systems
 - Optical Character Recognition (OCR) and document analysis
 - Translation
 - Catboats/reference services
 - Research support
 - Citation analysis
 - Knowledge discovery

However, it is incorrect to view AI merely as an automation tool. Recent IFLA guidance emphasizes the responsible, inclusive, and sustainable use of AI, linking it to library values.

There is also a complex relationship between AI and copyright. IFLA noted in 2025 that copyright laws can affect both the training and use of AI models; therefore, libraries need to balance the benefits of AI with copyright considerations.

Consequently, a model involving human intervention is more appropriate for libraries. AI can assist with search and analysis, but final evaluation and ethical responsibility rest with trained human professionals.

INFORMATION LITERACY AND AI LITERACY

As the availability of information in a library without borders increases, the importance of information literacy does not diminish; rather, it grows.

The following user skills will be required:

- Developing an appropriate search strategy;
- Understanding the difference between primary and secondary sources;
- Verifying the reliability of academic sources;
- Identifying misinformation;
- Evaluating AI-generated content;
- Identifying fake citations;
- Understanding copyright and plagiarism;
- Creating correct citations;
- Maintaining personal information security.

Therefore, a key task for the library of the future will be to shift from “access to information” to “information discernment.”

CHALLENGES FOR LIBRARIES WITHOUT BORDERS

- **Digital divide:** The greatest paradox of libraries without borders is that digital technology reduces boundaries, yet digital inequality creates new ones. In 2024, 68% of the global population used the internet, but in low-income countries, this figure was only 27%. Global internet usage stood at 48% in rural areas, whereas it reached 83% in urban areas (International Telecommunication Union).
Therefore, it is not scientifically accurate to equate "online availability" with "universal access."
- **Copyright and licensing:** Digital resources can be easily copied and distributed; however, publisher licensing agreements often impose restrictions on access, downloading, interlibrary sharing, and long-term preservation. According to the recent IFLA statement on copyright and AI, copyright frameworks can impact both AI and access to information (IFLA).
- **Privacy:** Digital library systems can collect data on user search behaviour, reading history, and authentication details. IFLA has described excessive data collection as a threat to privacy and freedom of expression (IFLA). Consequently, library privacy policies must incorporate data minimization, limited retention, transparency, and accountability regarding third-party providers.
- **AI bias and hallucinations:** Outputs from AI systems may contain biases or factual errors. If a library chatbot provides incorrect information or citations, the library's credibility may be compromised.
- **Linguistic inequality:** In countries like India, maintaining digital library systems based solely on English will not achieve information equality. Infrastructure for OCR, NLP, translation, and metadata is required in Gujarati, Hindi, and other Indian languages.
- **Financial and structural constraints:** Digital transformation requires continuous financial investment in hardware, software, licenses, bandwidth, cybersecurity, and skilled personnel.

NEW OPPORTUNITIES

- **Open Access and Open Science:** The UNESCO Recommendation on Open Science provides a global framework for making scientific knowledge accessible, inclusive, and reusable. Open publications, data, educational resources, and infrastructures are key components of this framework (UNESCO). Libraries can play a pivotal role in implementing Open Science through institutional repositories and research support services.
- **Global Resource Sharing:** Interlibrary loans, union catalogues, and document delivery services allow one library's collections to be made available to users at another. This reinforces the concept of a "shared global collection" rather than "one library, one collection."
- **Digital Preservation:** Digital preservation can protect historical documents, manuscripts, local history records, and cultural heritage from physical loss.
- **Multilingual AI:** AI-powered translation, OCR, and speech recognition technologies can enhance access to information in Indian languages. This area is of particular importance for the "library without borders."
- **Inclusive Library Services:** Access to knowledge for users with disabilities can be improved through assistive technologies, screen readers, text simplification, and accessible digital interfaces. Research on digital libraries in 2024 has demonstrated the potential of language

models to make academic abstracts more accessible and readable, suggesting that AI can be useful not only for search and discovery but also for comprehension and accessibility.

INDIA'S PERSPECTIVE

The potential for "libraries without borders" in India is immense. The country's extensive higher education system, linguistic diversity, broad digital infrastructure, and national digital library initiatives create a favourable environment for this concept. Initiatives such as the National Digital Library of India (NDLI) have sought to provide integrated digital access to a wide range of educational and research resources.

Similarly, e-ShodhSindhu serves as a key framework for collaborative access to electronic resources for higher education institutions. Institutional access agreements for various subscribed databases and electronic resources are available through the INFLIBNET platform. Furthermore, library networking and resource-sharing agreements can further strengthen India's "libraries without borders" model.

However, there are three specific challenges within the Indian context:

- 1) First, the digital divide between rural and urban areas.
- 2) Second, the lack of sufficient digital content and language technologies for Indian languages.
- 3) Third, the need for continuous training in emerging technologies and artificial intelligence for library and information science professionals.

Rajarshi's study on Indian library and information science professionals also reveals a positive attitude toward AI adoption, alongside a need for technical, analytical, and ethical competencies, as well as the importance of training and infrastructure investment (Rajarshi).

THE CHANGING ROLE OF LIBRARY AND INFORMATION SCIENCE PROFESSIONALS

The traditional role of the librarian in the global library is shifting from that of a "collection manager" to a "guide to knowledge and situations."

The following competencies will be important for future library and information science professionals:

AI	Evaluation and responsible use of AI tools
Data	Data management and analytics
Digital	Digital preservation and repository management
Information	Advanced search and information evaluation
Ethics	Privacy, copyright and AI ethics
Teaching	Information and AI literacy instruction
Research	Research data management and scholarly communication
Communication	Virtual reference and digital engagement

Therefore, a curricular transformation in Library and Information Science education is necessary. Traditional training in cataloguing and classification alone will not suffice for the libraries of the future.

LIBRARIES WITHOUT BORDERS AND SUSTAINABLE DEVELOPMENT

Libraries can directly align with the Sustainable Development Goals (SDGs).

In particular:

- SDG 4 – Quality Education
- SDG 5 – Gender Equality
- SDG 8 – Decent Work
- SDG 9 – Industry, Innovation, and Infrastructure
- SDG 10 – Reduced Inequalities
- SDG 16 – Peace, Justice, and Strong Institutions
- SDG 17 – Partnerships

Libraries can contribute to education and social inclusion through open knowledge, digital literacy, and community access.

UNESCO's Open Science framework also emphasizes open knowledge and international cooperation, reinforcing the role of libraries as key conduits for global knowledge.

KEY FINDINGS

The following key conclusions are drawn from this study:

- Libraries are shifting from physical repositories to networked knowledge ecosystems.
- Digital transformation reduces access barriers but also creates new digital inequalities.
- AI enhances automation and discovery capabilities in library services.
- Human oversight, transparency, and ethical governance are essential in the use of AI.
- Open access and open science are important pillars for knowledge without borders.
- The digital divide is one of the most serious social challenges for libraries without borders.
- Privacy and copyright must be priorities in digital library governance.
- Information literacy is no longer merely a support service for libraries but a fundamental professional responsibility.
- AI literacy will become an essential competency for future library and information science professionals.
- The digitization of Indian languages is of utmost importance for Indian libraries without borders.
- India has laid a significant foundation through NDLI, e-ShodhSindhu, and other networked initiatives.
- The library of the future must be evaluated based on access, impact, inclusion, and user empowerment, rather than collection size.

DISCUSSION

An important theoretical conclusion emerges from this study: viewing the “library without borders” solely as a technological innovation fails to capture its full potential. If a library possesses advanced artificial intelligence but its users lack internet access or digital skills, it cannot be a library without borders.

Similarly, if digital resources are available but their use is constrained by copyright or excessive authentication restrictions, the “library without borders” remains incomplete.

Therefore, three levels of a library without borders can be distinguished:

Level 1: Technological borders

Digital access from anywhere.

Level 2: Functional borders

Information can be easily found, understood, and used.

Level 3: Social borders

Access to information that is as free as possible from economic, linguistic, geographic, physical, and social limitations. A library without borders in the true sense of the word will only exist when all three levels function in unison.

RECOMMENDATIONS

- a) **Universal Digital Access:** Government and library institutions must integrate broadband, public Wi-Fi, affordable devices, and digital literacy into library development.
- b) **AI Governance:** All academic and research libraries must develop an AI usage policy covering privacy, copyright, bias, transparency, accountability, and human verification.
- c) **Library and Information Science Curriculum Reform:** Training in Library and Information Science must include the following subjects:
 - ✓ Artificial Intelligence
 - ✓ Data Science
 - ✓ Research Data Management
 - ✓ Digital Preservation
 - ✓ Cybersecurity
 - ✓ Open Science
 - ✓ Copyright and Licensing
 - ✓ AI Ethics
 - ✓ Digital Humanities
- d) **Digital Investment for Indian Languages:** OCR, NLP, machine translation, speech recognition, and searchable digital collections must be developed for Indian languages, including Gujarati.
- e) **Open Access Infrastructure:** Library professionals must play an active role in scholarly communication to strengthen institutional repositories and open educational resources. 21.6 Privacy by Design: Library software must incorporate principles of privacy and data minimization from the outset.
- f) **International Collaboration:** Global library networks must be strengthened to facilitate metadata interoperability, digital preservation, resource sharing, and cross-border research collaboration.
- g) **Continuous Professional Development:** Regular training programs on AI, digital tools, data literacy, and research support must be organized for library and information professionals.

ORIGINAL CONCEPTUAL PROPOSAL

Based on this study, the following conceptual formula for a library without borders is proposed:

Library without borders = Technology + Equitable access + Open knowledge + Human experience + AI + Literacy + Ethics + Global collaboration



This formula suggests that no single technology turns a library into a library without borders. The absence of borders is the result of an ecosystem, achieved through the combination of infrastructure, access, skills, ethics and collaboration.

CONCLUSION

Libraries and information science are currently undergoing a transformation in which a library's value is no longer determined solely by its physical collection. The digitization of information, cloud computing, open access, artificial intelligence, and global networks have extended the library beyond its physical boundaries, making it an active part of the global knowledge system.

The term "library without borders" aptly captures this transformation; however, to fully grasp it, one must understand the distinction between "digital" and "borderless." While digitization is a technological process, becoming "borderless" represents a social, moral, and cognitive achievement.

Despite rising global connectivity, 2.6 billion people remained offline in 2024, and the digital divide between rural and urban areas remained significant (International Telecommunication Union). Consequently, libraries of the future must prioritise digital inclusion over the mere expansion of digital collections.

AI creates new possibilities within this transformation, yet its responsible use must align with library values. IFLA's latest AI framework links values such as equitable access, privacy, openness, and accountability to AI. Thus, the librarian of the future will not be a professional replaced by technology, but rather a knowledge mediator who manages technology for the benefit of humanity. Their role will extend beyond simple information retrieval to encompass information evaluation, digital and AI literacy, ethical usage, research support, and the protection of information rights.

This transformation is particularly significant for India. Initiatives such as NDLI, e-ShodhSindhu, institutional repositories, and library networks provide essential support for borderless knowledge management. However, the next phase must place special emphasis on Indian languages, rural populations, people with disabilities, and digital literacy. Ultimately, the goal of a library without borders is not to "take books beyond the walls," but to "free knowledge from barriers." If technology, human experience, open access, ethics, and social inclusion are properly integrated, the library will not only survive in the future knowledge society but will also become a vital hub for learning, research, innovation, social equity, and sustainable development.

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