

Factors influencing digital library adoption in developing countries with A special references to India and Nigeria: A review

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Abstract: Digital libraries play a crucial role in closing information access gaps, fostering educational equity, and promoting lifelong learning, particularly in developing countries facing infrastructural and socio-economic constraints. Despite their transformative potential, the adoption of digital libraries in these contexts remains limited due to a variety of persistent challenges. The existing literature on this topic is often fragmented and lacks comprehensive, comparative analysis especially between countries with similar developmental contexts. This review addresses this gap by systematically synthesizing findings from 24 empirical and theoretical studies, focusing on India and Nigeria. The analysis identifies six major categories of influencing factors: technological, human, organizational, cultural, financial, and comparative insights. Common technological barriers include outdated ICT infrastructure and platforms that are not optimized for mobile use. Human-related issues such as low digital literacy, technophobia, and resistance to change also obstruct adoption. Institutionally, Nigeria suffers from weak policy frameworks and limited funding, in contrast to India's more centralized programs like INFLIBNET and NDLI. Cultural and social elements, including language diversity and a continued preference for print materials, add further complexity. Financially, the high cost of devices and internet access limits both individual and institutional participation. Though India and Nigeria share many of these barriers, India benefits from national coordination, whereas Nigeria's progress is more decentralized and inconsistent. The review underscores the urgent need for inclusive policies, sustainable funding, digital skill development, and context-appropriate technologies. It also identifies gaps in the literature, such as a lack of longitudinal studies and limited attention to marginalized user groups, offering guidance for future research and policy planning.

Keywords: Digital Libraries, Adoption factors, Developing Countries, Technology Acceptance, Information Access.

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Introduction

Digital libraries represent a significant advancement in the management, storage, and dissemination of knowledge resources, especially in developing countries where traditional access to information is often constrained by infrastructural and socioeconomic limitations. Unlike conventional libraries that rely on physical collections, digital libraries leverage electronic platforms to offer remote access to a diverse array of resources, including academic publications and multimedia content. This shift from print to electronic media, and from ownership to access, has been largely driven by rapid technological development. In developing nations, digital libraries are crucial for enhancing teaching, research, and learning. They play a transformative role as "agents of knowledge democratization," bridging geographical and resource divides (Agrawal, 2024). Their ability to offer "anytime, anywhere" access makes them essential tools for promoting inclusive information access in countries such as India and Nigeria (Fakunle, Bakare, & Adeyeye, 2022). As libraries evolve from physical spaces to borderless environments (Salubi, 2025), digital platforms support the global movement towards knowledge societies and lifelong learning agendas.

Globally, the adoption of digital library systems reveals contrasting patterns between developed and developing nations.

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While the former benefit from well-established infrastructure, countries like India and Nigeria face multifaceted challenges that hinder smooth adoption. Nevertheless, digital library initiatives have grown significantly in these regions, supported by government programs and academic efforts. In India, adoption has been driven by national-level initiatives led by bodies like the University Grants Commission (UGC) and agencies such as INFLIBNET, which provide university libraries with access to a vast range of scholarly e-resources (Ganaie, 2013; Kato, 2021). In contrast, Nigeria has witnessed more decentralized and institution-led adoption processes, primarily due to the absence of a unified national policy (Eke, 2011). However, both countries grapple with common barriers typical of developing contexts, such as unreliable internet connectivity (Singh & Sharma, 2024; Ojobor, Okafor, & Ugwuanyi, 2025), inconsistent power supply (Eke, 2011; Raju & Patnala, 2024), and limited technological skills among library staff and users. These challenges reinforce a persistent digital divide, marked by disparities in access and usage between urban and rural populations (Odu & Omosigho, 2017; Ganaie, 2013).

This literature review seeks to identify and analyze the key factors influencing the adoption of digital libraries in developing countries, focusing specifically on India and Nigeria. These two

countries serve as pertinent case studies due to their large populations, growing higher education sectors, and varied socio-technological landscapes. The review aims to synthesize existing research to highlight the drivers and inhibitors of digital library adoption and use. Drawing on empirical studies grounded in theoretical frameworks such as the Technology Acceptance Model (TAM) (Oyewo & Tiemo, 2024; Sekar et al., 2025) and other models that explore technological, organizational, social, and economic factors, the analysis will address infrastructural challenges (Raju & Patnala, 2024; Ojobor, Okafor, & Ugwuanyi, 2025), the role of institutional policy and funding (Raju & Patnala, 2024; Singh & Sharma, 2024), and human elements such as the digital literacy of librarians and users (Pandey & Madhusudhan, 2024; Udoh, Ekpenyong, & Olowookere, 2020). Ultimately, this synthesis will consolidate current knowledge, identify gaps in the literature, and offer comparative insights into the context-specific strategies of India's centralized approach and Nigeria's decentralized trajectory providing a broader understanding of digital library adoption across the developing world.

Methodology

This study employs a systematic literature review (SLR) methodology to comprehensively analyze and synthesize existing research on the factors influencing digital library adoption in developing countries, with a special focus on India and Nigeria.

Systematic Literature Search

The literature search was conducted using a systematic approach to identify relevant peer-reviewed articles, reports, and other scholarly publications. An initial broad search across major electronic databases and academic search engines (e.g., Scopus, Web of Science, Google Scholar) yielded 2,580 articles.

I have carefully reviewed and reorganized the provided text to create a comprehensive and cohesive summary in English, using the exact terms and concepts from the source material.

Search Strategy and Criteria

The literature search was conducted in three main stages to ensure a thorough and targeted selection of relevant articles.

- **Initial Search (Broad):** This phase used core keywords such as "digital library adoption," "ICT for libraries," "developing countries," "India," and "Nigeria" to yield a large set of initial results.
- **Refined Search (Specific):** The initial results were then refined by adding more specific factors and contexts, such as "technological factors," "human factors," and "India" or "Nigeria," to narrow down the selection.
- **Targeted Search (Citation Chasing):** A final, targeted search was performed by manually reviewing the reference lists of the most relevant articles to identify other key publications.
- Following these search stages, a rigorous screening process was applied using specific inclusion and exclusion criteria.
- **Inclusion Criteria:** Studies had to focus on factors influencing digital library adoption in developing countries, with a specific emphasis on research related to India and/or Nigeria. The research also had to be directly related to the adoption of digital libraries in developing countries.

- **Exclusion Criteria:** Studies were excluded if they lacked full-text availability, fell outside the defined scope, or were not original research papers.

This systematic process resulted in a final, comprehensive list of research papers selected for in-depth analysis.

Data Extraction and Analysis

Data was systematically extracted from the 24 included studies to facilitate a comparative analysis. A data extraction matrix was used to collect key information from each article, including:

- **Methodology Used:** To identify the research design and data collection instruments.
- **Theoretical Framework/Model:** To note if the study was guided by a specific theoretical model.
- **Factors Influencing Adoption:** To classify the key technological, human, and organizational factors discussed in each study.
- **Main Findings and Recommendations:** To summarize the principal outcomes and suggested solutions from each study.

A general descriptive analysis was performed to summarize the main findings from the compiled data. This comprehensive approach ensured that the analysis provided a robust and well-supported review of the factors influencing digital library adoption in the two target countries.

Result

This review synthesizes findings from multiple empirical studies and reviews on digital library adoption in India and Nigeria (Table 1). The results reveal a complex interplay of technological, human, organizational, cultural, and economic factors that either facilitate or hinder digital library use in developing country contexts.

Technological Factors

System usability, interface design, and infrastructure availability emerged as major determinants of adoption. In both countries, poor internet connectivity, unstable electricity, and obsolete ICT equipment were consistently reported as significant barriers (Udoh et al., 2020; Ojobor et al., 2025; Raju & Patnala, 2024; Pandey & Madhusudhan, 2024). For instance, Nigerian university libraries face frequent power outages and bandwidth limitations that affect access to digital platforms (Whong & Magoi, 2024; Odu & Omosigbo, 2017). In India, studies note challenges related to outdated systems and limited digital infrastructure, especially in rural and less privileged institutions (Sharadamma & Hemavathi, 2024; Sekar et al., 2025). Mobile-friendly and low-bandwidth platforms were highlighted as potential enablers for broader access in underserved areas (Whong & Magoi, 2024).

Human Factors

Digital literacy levels among users and staff significantly influence adoption rates. Across studies, a lack of advanced ICT skills among librarians and students especially in areas such as content creation, metadata management, and multimedia tools was a recurring issue in both Nigeria and India (Suleiman et al., 2025; Udoh et al., 2020; Ilori et al., 2023; Sekar et al., 2025). Technophobia, poor motivation, and resistance to change were also frequently identified (Bulugu & Nkebukwa, 2024; Ojobor et al.,

2025). Gender and age disparities affected digital engagement, with younger, male, and urban-based users generally showing higher usage of digital libraries (Fakunle et al., 2022; Olaniyi et al., 2024).

Organizational and Institutional Factors

Institutional support including funding, training opportunities, and strategic leadership plays a pivotal role in facilitating adoption (Ojobor et al., 2025; Suleiman et al., 2025; Sekar et al., 2025). In Nigeria, underfunding and absence of clear digitization policies were commonly reported (Eke, 2011; Raju & Patnala, 2024). Libraries in both countries often lack adequate budgets for acquiring digital resources or maintaining up-to-date ICT systems (Agrawal, 2024). In contrast, Indian initiatives such as INFLIBNET and the National Digital Library of India have contributed positively, although rural disparities persist (Ganaie, 2013; Sharadamma & Hemavathi, 2024). Nigerian efforts were more decentralized and uneven across institutions (Oyewo & Tiemo, 2024).

Cultural and Social Factors

Awareness, trust, and sociocultural attitudes toward digital tools influenced user engagement. In both countries, limited awareness of available digital services and preference for print materials persisted, especially among older or less digitally literate users (Pandey & Madhusudhan, 2024; Udoh et al., 2020; Oyewo & Tiemo, 2024). Language diversity in India and the urban-rural divide in Nigeria further exacerbated access inequality (Whong & Magoi, 2024; Ganaie, 2013). Peer influence and institutional

promotion were shown to improve trust and social acceptance of digital libraries (Sharadamma & Hemavathi, 2024; Ilori et al., 2023).

Economic and Financial Factors

Affordability and sustained investment were critical to adoption success. For individual users, the cost of internet access, digital devices, and subscriptions posed significant challenges (Bulugu & Nkebukwa, 2024; Odu & Omosigbo, 2017). For institutions, limited funding affected staff training, software acquisition, and infrastructure upgrades (Eke, 2011; Suleiman et al., 2025). In Nigeria, financial pressures sometimes led to system transitions that resulted in data loss (Oyewo & Tiemo, 2024), while in India, partnerships and consortia like N-LIST were useful in mitigating budget constraints (Sharadamma & Hemavathi, 2024; Agrawal, 2024).

Comparative Insights Between India and Nigeria

Both countries share core challenges such as inadequate infrastructure, funding gaps, and digital skill shortages yet differ in strategic responses. India benefits from nationally coordinated digital initiatives (Ganaie, 2013; Agrawal, 2024), while Nigeria's efforts are more decentralized and institution-specific (Udoh et al., 2020; Ojobor et al., 2025). India's focus on linguistic localization contrasts with Nigeria's emphasis on infrastructure and training. Despite these differences, both countries recognize digital libraries as essential tools for educational equity and research development (Ilori et al., 2023; Fakunle et al., 2022).

Table 1: Summary of Key Factors Influencing Digital Library Adoption in India and Nigeria

Themes	Key Findings	Countries	References
Technological Factors	Poor internet, power outages, obsolete ICT equipment; mobile-friendly platforms recommended for low-bandwidth environments.	India, Nigeria	Udoh et al. (2020); Ojobor et al. (2025); Raju & Patnala (2024); Pandey & Madhusudhan (2024); Whong & Magoi (2024); Sharadamma & Hemavathi (2024); Sekar et al. (2025)
Human Factors	Low ICT proficiency, technophobia, lack of motivation, digital skill gaps especially among librarians and students.	India, Nigeria	Suleiman et al. (2025); Ilori et al. (2023); Sekar et al. (2025); Bulugu & Nkebukwa (2024); Ojobor et al. (2025); Fakunle et al. (2022); Olaniyi et al. (2024)
Organizational & Institutional Factors	Lack of funding, weak policies, limited staff training; centralized programs in India (e.g., INFLIBNET) versus fragmented efforts in Nigeria.	India, Nigeria	Eke (2011); Raju & Patnala (2024); Ojobor et al. (2025); Suleiman et al. (2025); Ganaie (2013); Agrawal (2024); Sharadamma & Hemavathi (2024); Oyewo & Tiemo (2024)
Cultural & Social Factors	Low user awareness, resistance to digital tools, preference for print, language barriers (India), digital divide (Nigeria).	India, Nigeria	Udoh et al. (2020); Pandey & Madhusudhan (2024); Oyewo & Tiemo (2024); Ganaie (2013); Whong & Magoi (2024); Sharadamma & Hemavathi (2024); Ilori et al. (2023)
Economic & Financial Factors	High cost of internet and equipment for users; underfunding of libraries; institutional data loss due to poor migration; consortia support helpful in India.	India, Nigeria	Bulugu & Nkebukwa (2024); Odu & Omosigbo (2017); Eke (2011); Suleiman et al. (2025); Oyewo & Tiemo (2024); Agrawal (2024)
Comparative Insights	Shared infrastructural and skill-related challenges; India has stronger policy frameworks; Nigeria focuses more on local innovations and staff capacity.	India, Nigeria	Ganaie (2013); Agrawal (2024); Udoh et al. (2020); Ojobor et al. (2025); Ilori et al. (2023); Fakunle et al. (2022)

Discussion

The adoption of digital libraries in developing countries such as India and Nigeria presents a multifaceted challenge shaped by technological, human, organizational, cultural, and financial dimensions. The results of this review affirm that while there is widespread recognition of the transformative potential of digital libraries, their implementation and effective utilization remain uneven and hindered by systemic constraints.

From a technological standpoint, infrastructural deficiencies including unreliable power supply, low internet bandwidth, and outdated ICT equipment are persistent challenges (Udoh et al., 2020; Ojobor et al., 2025). These infrastructural issues are further exacerbated by the lack of mobile-optimized platforms and responsive digital interfaces, particularly critical in rural or underserved regions (Sharadamma & Hemavathi, 2024; Whong & Magoi, 2024). Although mobile technologies and low-bandwidth innovations show promise, their implementation has not been widespread.

Human capacity also plays a crucial role in shaping adoption outcomes. The digital skill gap among both librarians and users remains pronounced, especially in Nigeria, where technophobia and limited exposure to ICT tools continue to affect confidence and usage levels (Suleiman et al., 2025; Fakunle et al., 2022). In India, resistance to change and lack of ongoing professional training among library professionals were similarly noted as barriers (Sekar et al., 2025). These findings emphasize the need for continuous capacity building, digital literacy campaigns, and integration of ICT training into university curricula.

Institutional and organizational factors further mediate the success of digital library adoption. While India has implemented national-level programs like INFLIBNET and the National Digital Library of India (NDLI), Nigeria's approach has been more institution-driven and less coordinated (Agrawal, 2024; Oyewo & Tiemo, 2024). Institutional support, management commitment, and policy direction were all found to significantly influence user uptake and sustainability (Ganaie, 2013; Raju & Patnala, 2024). Additionally, the absence of clear digitization policies and sustainable funding strategies hampers long-term digital library development in both countries (Eke, 2011).

Cultural and social dynamics, such as user awareness, trust, and preference for print materials, are non-negligible in influencing digital library adoption. For instance, linguistic diversity in India requires multilingual platform development, while in Nigeria, digital divides along gender, location, and economic status limit equitable access (Ilori et al., 2023; Pandey & Madhusudhan, 2024). Social influence, including peer norms and academic expectations, has emerged as a motivator for use when supported by strong institutional frameworks.

Economically, digital libraries are constrained by both the high cost of access (internet, devices, subscriptions) and limited institutional investment (Odu & Omosigho, 2017; Bulugu & Nkebukwa, 2024). Public-private partnerships, consortia-based subscriptions (e.g., N-LIST in India), and subsidized access models may offer sustainable solutions, but these require stronger governance and policy integration.

Comparatively, India exhibits a more structured digital library ecosystem underpinned by national coordination and policy frameworks, while Nigeria's system is largely fragmented and

locally implemented. Nonetheless, both countries face similar barriers, including infrastructure, funding, and human resource limitations, suggesting that regional innovations must be scaled through national strategies for broader impact.

Research Gap

Despite increasing research attention, several gaps remain in the literature on digital library adoption in developing countries:

1. **Limited Longitudinal Studies:** Most existing studies are cross-sectional. There is a need for longitudinal research to track how digital library adoption evolves over time, particularly in response to infrastructure improvements or policy changes.
2. **Underrepresentation of User Subgroups:** Marginalized groups such as students in rural institutions, individuals with disabilities, and women are underrepresented in empirical studies. Future research should focus on these populations to develop inclusive adoption models.
3. **Lack of Comparative Studies Across Institutions:** While comparisons between India and Nigeria exist, few studies compare adoption across different types of institutions (e.g., public vs. private universities, technical vs. non-technical disciplines).
4. **Limited Focus on Advanced Technologies:** There is scant literature examining the integration of emerging tools such as AI, machine learning, and predictive analytics into digital library systems in these regions (Whong & Magoi, 2024).
5. **Policy Impact Evaluation:** Few studies have systematically evaluated the effectiveness of national programs (e.g., NDLI, INFLIBNET) or institutional policies in driving digital library adoption and usage.
6. **Absence of Localized Theoretical Models:** Existing frameworks like TAM and UTAUT are often applied without cultural adaptation. There is a gap in developing localized or hybrid models that better reflect the sociocultural and infrastructural realities of developing countries.

Conclusion

This review has examined the multifactorial influences affecting the adoption of digital libraries in developing countries, with particular emphasis on India and Nigeria. The findings underscore that while digital libraries hold immense potential to democratize access to knowledge, their effective implementation remains constrained by a combination of technological, human, institutional, cultural, and economic barriers.

Technological challenges such as poor internet connectivity, outdated infrastructure, and intermittent power supply continue to hinder seamless access to digital resources. These are compounded by significant digital skill gaps among both users and library staff, as well as attitudinal barriers including technophobia and resistance to change. Furthermore, institutional support remains inconsistent; while India has implemented relatively structured, policy-driven digital library programs (e.g., INFLIBNET, NDLI), Nigeria's progress is primarily institution-based and suffers from a lack of national coordination and investment.

Culturally, user trust, awareness, and linguistic relevance are critical but often overlooked dimensions. Economically, affordability of access and sustained financial support for digital infrastructure remain pressing concerns in both nations. Despite these challenges, comparative insights suggest that with targeted interventions such as mobile-friendly platforms, continuous ICT training, public-private partnerships, and inclusive policy frameworks digital libraries can serve as powerful tools for enhancing educational equity and knowledge access.

The review also highlighted research gaps that require attention, particularly in relation to marginalized user groups, localized adoption models, and the long-term impact of national initiatives. Addressing these gaps will be essential for developing robust, context-sensitive strategies that not only facilitate adoption but also ensure the sustainability and relevance of digital libraries in the rapidly evolving information ecosystems of the Global South.

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Conflict of interest

The author declares no conflict of interest related to the research, authorship, and/or publication of this article

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