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## ICT-BASED LIBRARY SERVICES IN DEVELOPING COUNTRIES: STRATEGIC CHALLENGES, OPPORTUNITIES, AND POLICY INTERVENTIONS

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### Abstract:

Information and Communication Technology (ICT) has transformed library services all over the globe by making it possible talking more swiftly, broadly, and inclusively with people. ICT integration in the library systems of developing countries is full of potential for educational success, digital divide reduction, and the promotion of lifelong learning. However, various challenges are faced by the implementation of ICT-based library services, such as inadequate infrastructure, limited funding, lack of trained professionals, and socio-economic barriers like low digital literacy, and unequal internet access. This piece is devoted to discussing and confronting challenges caught by the upsurge in ICT adoption in libraries of developing nations and simultaneously outlining opportunities. By means of SWOT, PESTLE, and GAP analysis, the study offers an all-embracing approach to evaluate the present situation and the future of the ICT-operated library services. Examples of countries are used to bring out innovative practices and successful models that can function as references. The article ends by giving practical suggestions to policymakers, librarians, and other stakeholders to fill in the existing gaps and unleash the power of ICT in library development. At last, ICT-driven libraries have a great role to play in knowledge societies, especially after they are aligned with national inclusive strategies and international supports.

**Keywords:** ICT-based library services, digital divide, developing countries, PESTLE analysis, SWOT analysis, library infrastructure, digital literacy, information access.

### Introduction

The world has revolutionized itself in the field of digital technology and the role of libraries has already changed drastically. The traditional libraries were once limited to printed collections and physical spaces only, but nowadays they are planning to deliver digital services seamlessly, remote access to resources, and personalized learning experiences. The usage of Information and Communication Technology (ICT) in library systems is the most important topic for developing countries, who still face a lot of problems with the access to knowledge and technology, that are the main obstacles for them.

Developing countries often face an abundance of challenges on their way to insuring of equitable access to education and information. As places where local people gather, libraries have the power to eliminate these obstacles if only they can get necessary ICT arms, broadband internet, and skilled workers. Using ICT-based library services can give the green light to the digital learning resources, help to carry out distance learning, actively engage users, and promote lifelong learning. The good news is, these technological services extensively make their services available, but infrastructural deficit, limited fund, lack of digital literacy, and policy-level gaps are the hiccups that hold them back.

This article aims to point out the significance and potential of ICT-based library services although it traces the growth, survival, and extent of these services in under-resourced areas. The SWOT, PESTLE, and GAP analysis perspectives were the launching points to evaluate the present environment, recognize significant obstacles, and outline new prospects. As well as this, the report refers to actual example and policy frameworks to show how developing countries can convert their libraries into digital-learning empowered and inclusive communities.

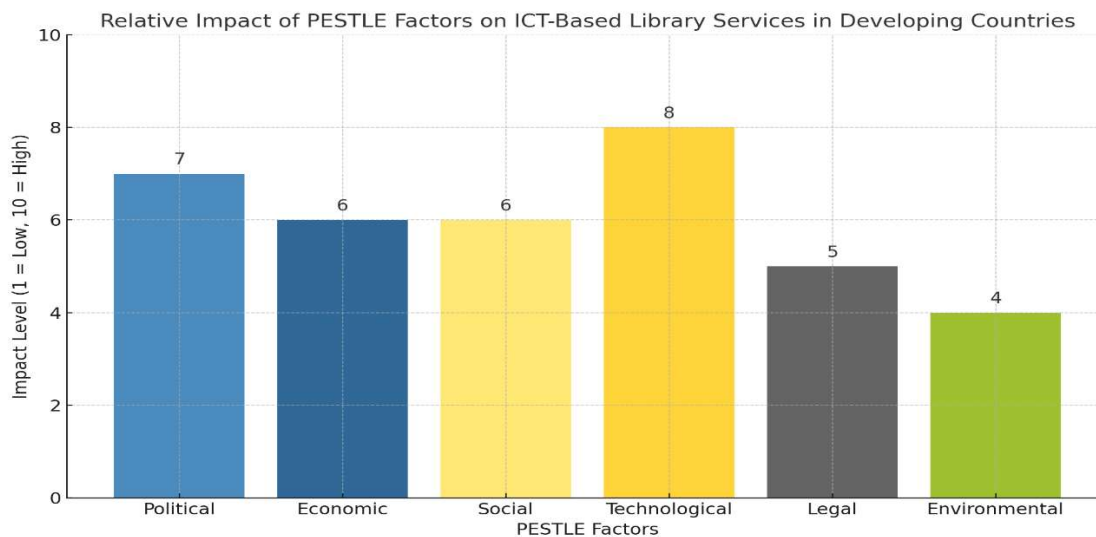


## Background and Context

The infusion of ICT has been a major factor in the tremendous transformation of library services which has affected reorganization of information accessed, processed and distributed. Around the globe, libraries have made a complete turnaround from being mere custodians of printed materials to energetic centers of knowledge that offer a plethora of digital services. Speaking in terms of developing countries, it is not only a necessity but also a challenge to pass through this transition which is therefore influenced by a multitude of socio-political and economic factors.

Services provided by the ICT-based library carry unlimited advantages such as the possibility of real-time access to the global pool of information, efficient cataloging, sharing of resources, and distance education and research support, which are all qualitative improvements. The recent systematization of global library services realizes the principles of the international community in the field of education and the Sustainable Development Goals (SDGs), especially Item 4: Quality Education outlined by the UN. Regrettably, however, the digital divide still presents a serious problem, as many developing world libraries are struggling to deal with this problem due to the issues of old infrastructure, lack of funds, and shortage of trained ICT personnel.

To get a comprehensive picture of the external forces that may influence the growth of ICT-based library services in such places, a PESTLE analysis can prove to be a very good tool. This investigative framework looks into six major areas, which are political, economic, social, technological, legal, and environmental, that influence the success and the implementation of digital projects in libraries.



### Analysis of Figure 1:

The bar chart presents the relative importance of each PESTLE factor that has an influence on ICT-based library services in developing countries. The respondents were required to rate the impact of each factor on a scale of 1 to 10.



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Among all the factors:

- Technological (8/10) and Political (7/10) dimensions are most influential, indicating the need for a good infrastructure, internet and a government policy that supports the business for successful ICT implementation.
- Economic and Social factors (6/10 each) are of equal impact, thus going to be the issues that are coupled with budget constraints and socially illiterate users of the library who might not understand digital and staff that may not understand the digital world.
- Legal factors (5/10) are still an issue but less so and mostly they are related to a lack of copyright policy and limited open access.
- Environmental issues (4/10) are given less attention and considered their least importance in the study, however, they may become more dominant due to the increased use of electronic devices, and to comply with sustainable ICT requirements.

Quite obviously, this analysis points to the fact that policy direction, technological access, and financial investment are the primary drivers of ICT-enabled library growth, and targeted strategies along with international cooperation are going to be the necessary response.

### 3. Current Status of ICT in Libraries in Developing Countries

The situation is that the extent of Information and Communication Technology (ICT) adoption in libraries in developing countries is quite limited. On the one hand, there are examples of successful establishments in some places and on the other hand, many libraries are still struggling with insufficient and old-fashioned digital infrastructure that makes it difficult for them to meet the needs of the communities they serve. This section sketches the present conditions and briefly tells the good and bad sides of the ICT-driven library services.

#### Infrastructure and Connectivity

Most public and academic libraries in developing countries have no stable internet connection, they cannot access modern computers, and at the same time, they do not have simple systems for managing the digital library. The only source of the problem here is the rural areas where electricity is very scarce which in turn makes the use of ICT impossible. The situation is no better even in urban centers as they suffer from low bandwidth and frequent network problems which make it difficult for them to operate smoothly.

Surveys conducted by UNESCO and other education bodies in the respective countries reveal that only about 40% of libraries have internet access in low-income countries, whereas the reality is that no more than 20% of those libraries provide online services and e-books. In comparison to this, some middle-income countries like India and South Africa have not only digitized their academic collections but also have national digital library portals. However, these services frequently remain limited to the institutions of higher education.

#### Digital Literacy and Human Resources

The use of ICT is restricted by the number of people who have the necessary skills to implement it. Many librarians in developing countries have very little education on how to use digital cataloguing tools, manage e-resources, or support virtual services. Sometimes training programs are intermittent or provided by donors, hence the quality of service is not guaranteed.

#### Access and Equity



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The digital divide in India is very apparent with the urban population having all the advantages. The users residing in the rural or tribal areas are rarely having the appropriate digital literacy skills, language support, or physical equipment to be able to use online library services. Women's and girls' more limited access to the use of ICT resources in some regions is a very important factor that intensifies the digital gap.

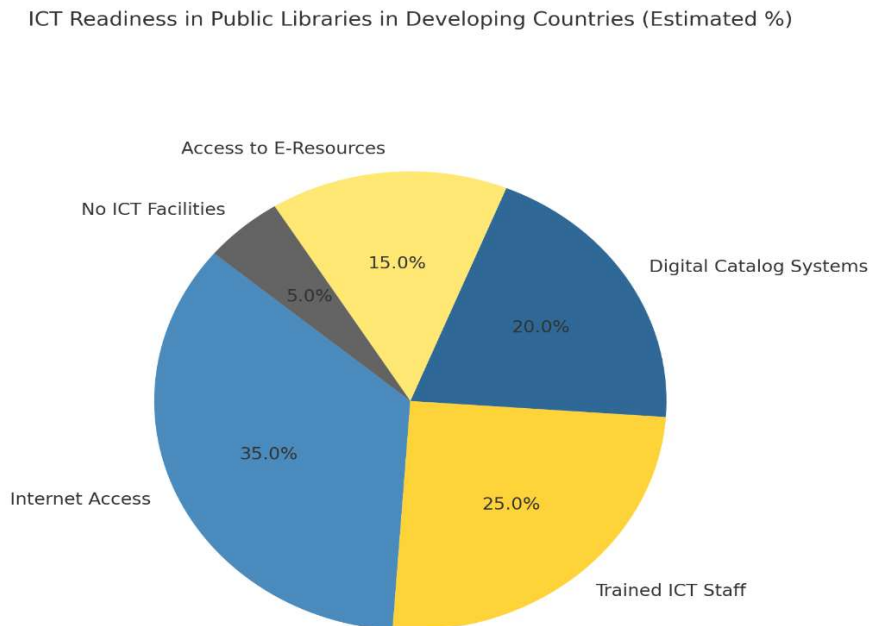
## Progressive Initiatives

Yet, a few positive developments stand out:

- The National Digital Library of India (NDLI) serves over 12 million items in different languages.
- The Kenya National Library Service (KNLS) brings high-tech funding and technology resources to rural areas through mobile units.
- The global fund-backed e-library platforms are set to lead the charge in bringing ICT into Bangladesh's secondary education.

These cases illustrate the potential for scalable and inclusive digital services when developed by communities, supported by solid policies, and well-funded.

**Figure 2**, a pie chart showing the **estimated ICT readiness in public libraries** across developing countries.



**Figure 2: ICT Readiness in Public Libraries in Developing Countries (Estimated %)**

### Interpretation:

- 35% of libraries have basic internet access, marking a critical first step toward ICT integration.
- Only 25% have trained staff capable of managing ICT-based services.
- 20% use digital catalog systems, indicating limited automation.



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- 15% offer access to e-resources (e-books, databases), primarily in urban or academic libraries.
- Alarming, 5% still have no ICT facilities at all.

The numbers clearly indicate a profound digital divide, especially between the urban and the rural libraries. The good side of it is that there is obvious progress; however, the necessity of national strategies and localized assistance cannot be overemphasized in scaling ICT adoption and making sure that the access.

#### **4. Indian Challenges in Implementing Information and Communication Technology (ICT)-Based Library Services**

Even though information and communication technology has transformative power in the modernization of library services, there are interrelated challenges that hinder the implementation process in the developing countries. These roadblocks are structural, financial, human, and policy-related which are often the reasons for the digital library services that are not equally distributed and not running in a sustainable way.

##### **1.Inadequate Infrastructure**

A major barrier is the lack of robust ICT infrastructure. Most of the public and school libraries operate without enough electricity, reliable internet, for example. Bandwidth limitations, old hardware, and no backup systems lead to a very less effective use of the digital services, especially in rural and underfunded areas.

##### **2. Limited Funding and Budget Constraints**

Integration of ICT needs a large investment in the beginning and also maintenance costs for the future. On the other hand, in many developing countries, the library budgets are either stagnating or decreasing. Saving on ICT is often considered more important than covering the basic operational costs; thus, there is very little room left for digital expansion or innovation.

##### **3. Shortage of Trained Personnel**

The availability of digitally skilled library staff is another pressing concern. Most of the librarians are not trained enough when it comes to using ICT tools, digital resource management, and customer support systems. There are very few chances for continuous professional development and if there are, it is very difficult to participate due to the lack of budget or institutional constraints.

##### **4. Weak Policy Frameworks**

Several countries national policies about ICT for education and library development are either no longer relevant, not aligned, or poorly implemented. The absence of particular provisions for licensing of the digital content, open access framework, and data privacy issues hinders the growth of user-friendly, legal library services.

##### **5.Digital Divide and User Inequity**

Equity in ICT-based library services is still very limited. People living in urban areas are more likely to have access to digital tools that they can use to improve their lives, whereas rural, tribal, and marginalized communities are often the ones that get the short end of the stick. The difference is further increased by a number of factors such as digital literacy, economic situation, language, and gender.

##### **6.Sustainability and Technological Obsolescence**

The speed at which technology develops is a challenge that lasts long. Most libraries cannot afford to keep the systems they use and upgrade them because of the high cost and lack of personnel. If there are no sustainable models for purchasing, maintaining, and updating content, then digital services become obsolete or may not work at all very quickly.





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**Table 1:** GAP Analysis – ICT-Based Library Services in Developing Countries

Component	Current Status	Ideal Standard	Identified Gap
Internet Connectivity	Unstable or unavailable in 60%	Reliable, high-speed access	Critical
Staff Competence	Basic ICT skills in <30% libraries	Fully trained staff in 100%	High
Digital Resources	Limited to a few databases	Wide, multilingual access	Large
Funding Allocation	Less than 5% of library budget	20–30% for ICT services	Severe
Policy Support	Outdated or generic	Targeted ICT-library policies	Substantial

This analysis shows very clearly that there is a lot of work needed through targeted investments, capacity-building initiatives, and inclusive policy reforms to break down the systemic barriers that are blocking the integration of ICT in the libraries.

## 5. Opportunities for Expanding ICT-Based Library Services

In spite of the many difficulties that the ICT in libraries sector has been facing, developing countries have the opportunities to transform libraries into digital services for the communities in their localities through the proper leveraging of those opportunities. With the suitable strategies, technologies, and partnerships, ICT-based services can be the digital divide and take sustainable educational development to a new level.

### 1. Mobile and Cloud Technologies

It is obvious that these handheld devices which are portable and of small size have found their place in every individual's life, and at the same time, it has become cheaper to use the cloud. All these present the most scalable solutions that can be utilized to enable higher library access. Mobile library apps, cloud-based digital repositories, and SMS-based services can disseminate library resources even in distant or underprivileged areas without the need of a huge investment in physical infrastructure.

### 2. Digital Inclusion and Lifelong Learning

ICT means that libraries can become the learning centers for non-formal education, adult literacy, and lifelong learning, principally for the marginalization groups. Libraries could become a place to make digital skills training and online course access (MOOCs) possible, thus achieving inclusive education that is in line with Sustainable Development Goal 4.

### 3. Public-Private and International Partnerships

Cooperation with technology companies, NGOs, and international organizations is one of the ways to get financial and technical resources, which are necessary for the development of digital services. The EIFL (Electronic Information for Libraries) project, UNESCO's Information for All Programme, and national initiatives such as Digital India are some of the examples of the partnerships. They have proven to be successful models that have opened the way for libraries access ICT infrastructure and training.

### 4. Open Access and Free Learning Resources

The popularity of the OERs (open educational resources) in institutional repositories and digital libraries opens new ways for libraries to give the best content with minimal financial burden. To mention some of them, NDLI (National Digital Library of India) and Directory of Open Access Journals (DOAJ) could be used locally to enhance library users' access to academic materials.



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## 5. Community-Centered Library Models

ICT has the potential to enable libraries to become community information hubs. Libraries can also support e-governance, health information, and employment opportunities. Libraries thus become the most relevant and appreciated resource of the community. Community involvement not only increases the sense of ownership but also ensures the continuation of ICT programs.

### Figure 3: SWOT Analysis of ICT-Based Library Services in Developing Countries

Here is the SWOT Analysis Chart for ICT-based library services in developing countries.

This visual clearly summarizes:

- Strengths (e.g., Mobile and internet usage , open source library),
- Weaknesses (e.g., limited ict training staff),
- Opportunities (e.g., partnerships and lifelong learning demand),
- Threats (e.g., cybersecurity and outdated policies).

#### SWOT Analysis of ICT-Based Library Services in Developing Countries



## 6. Case Studies and Best Practices

The integration of ICT into library services in developing countries is a subject which is widely covered in several research papers from various developing countries, but three of such countries stand out from the crowd as they have made exceptional progress in this direction. For instance, these case studies explore several examples of resource-constrained developing countries that have gone from being ICT-librarian service skeptics to enthusiastic data-driven tyrants by relying on technology, strategic planning, excellent community involvement, and external support to accomplish their goals and thus, achieving transformative change.



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## India: National Digital Library (NDLI) Initiative

The National Digital Library of India (NDLI) is a Ministry of Education project aimed at developing a virtual collection of learning materials that are accessible to all. It also provides content in a variety of languages at different educational levels such as books, theses, lecture audios, and simulations. This initiative is a great example of how digital platforms that are centralized can not only strengthen the education ecosystem but also open up greater access to educational materials even in remote and underprivileged areas.

## Kenya: KNLS Digital Transformation

Kenya National Library Service (KNLS) has been leading the way in the adoption of library services through the use of technology in East Africa. KNLS collaborated with the EIFL campaign to provide libraries with internet connection, computer facilities, and digital skills training for both staff and users. These outreach units are the means through which they can reach out to remote areas and communities to provide them with ICT access.

## Philippines: Tech4ED Centers

The Technology for Education, Employment, Entrepreneurs, and Economic Development (Tech4ED) initiative is among the ways through which the libraries become the access points of the digital world. Some of the services that it offers are e-learning, e-government, and employment portals. This model transforms libraries into full-fledged digital service hubs. This initiative can be a good example of how libraries transform into digital service hubs. The Department of Information and Communications Technology (DICT) runs this model.

## Bangladesh: Community e-Library Projects

There are a number of rural libraries in Bangladesh that have teamed up with NGOs like Shidhulai Swanirvar Sangstha that run the solar-powered floating libraries, which are the providers of internet access and e-learning tools. The local initiatives perfectly cater to the local needs since they focus on flood-prone areas in particular.

## South Africa: Smart Library Networks

South Africa Smart Library plan is aimed at bridging the divide between rural and urban libraries by means of ICT infrastructure, digital cataloguing, and staff training programs. The project, which is co-funded by government and universities, helps to facilitate open access and research

## Key Lessons from Case Studies:

- **Localization makes a difference:** Services designed for a community can meet local needs and get more acceptance and usage.
- **Partnerships fuel growth:** The joint efforts of different sectors can go far with the use of resources and the combination of talents.
- **Training is a must:** The creation of a workforce and also the training of users contribute to ICT greenness
- **Innovative delivery models:** (mobile, solar, floating) ensure access beyond infrastructure limits.

## 7. Policy Recommendations and Strategic Interventions

Developing countries need to take a multi-dimensional and inclusive policy approach for a wide range of ICT-based library services. A multi-dimensional approach and inclusive policy across all sectors are the right ones to take the fullest advantage of the potential of ICT in library services. The strategies below outline key intervention areas:

### 1. Formulation of a National ICT Policy for Libraries

Governments should draft responsible ICT policies that incorporate public libraries as key players in the digital development of the country. Such policies shall set minimum service standards for digital, define the funding structure, and provide the framework for redressing digital inequality, especially in remote areas.





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## 2. Capacity Building for Library Staff

Building confidence and thus efficiency of librarians' digital skills is vital. Profiles of the work areas for continuous training in the ICT field include ICT operations, digital literacy, e-resource management, and user engagement. Organizing training with partners such as universities, professional associations, and global ICT initiatives can improve training quality and accessibility.

## 3. Strengthening Infrastructure and Connectivity

Libraries have to be fitted with reliable internet, sufficient power supply, and new equipment if they are to really make a difference in the digital divide. The government can also provide infrastructure expansion in rural and remote areas through public-private partnerships and USO.

## 4. Promotion of Open Educational Resources (OER)

Libraries may be of great assistance when it comes to the finding and downloading of the free OERs that are in different languages and adhere to the curriculum. Support local content creation and integrate OER platforms to the library portals can increase digital learning as well as community engagement.

## 5. Ensuring Cybersecurity and Digital Ethics

A lot of data security issues are involved with the digitization. Policies should make sure there are basic cybersecurity facilities, privacy for the users, and compliance with the copyright law. At the same time, the training of the librarians on ethical matters in the access and use of the digital resources is of the same importance.

## 6. Establishment of Monitoring and Feedback Mechanisms

Libraries must implement organized methods for regular tracking and obtaining feedback to guarantee efficiency and responsibility. Part of this process involves gathering information about user demographics, extent of resource utilization, progress in digital literacy, and areas of service that need improvement. These kinds of data-driven evaluations not only help in implementing continuous improvements but also serve as a guide for policy changes in case of successful practices to be extended to the larger community.

## 7. Inclusive Engagement with Community and Partners

Turning libraries into lively digital centers means extensive cooperation not only with local communities but also with stakeholders. Going beyond traditional partnerships with schools, NGOs, local governments, and citizen groups, libraries can collaboratively develop relevant services, increase access, and generate trust and sustainability for ICT projects over time.

**Summary Table:** Strategic Interventions for ICT-Based Library Services in Developing Countries

Policy Area	Strategic Action
<b>1. National ICT Policy for Libraries</b>	Create inclusive digital library policies with funding, equity goals, and implementation frameworks.
<b>2. Librarian Capacity Building</b>	Conduct ongoing ICT training in digital tools, e-resource handling, and user engagement.
<b>3. Infrastructure and Connectivity</b>	Improve internet access, digital devices, and power backup through public-private partnerships.
<b>4. Open Educational Resources (OER)</b>	Promote free, multilingual digital learning materials; support local content creation.



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Policy Area	Strategic Action
<b>5. Cybersecurity and Digital Ethics</b>	Enforce user data protection, digital safety standards, and train staff on ethical digital practices.
<b>6. Monitoring and Feedback Mechanisms</b>	Track usage, outcomes, and service quality to guide data-driven enhancements and scalability.
<b>7. Community and Stakeholder Engagement</b>	Collaborate with schools, NGOs, and citizens to co-develop relevant, inclusive ICT library services.

### Conclusion:

The use of Information and Communication Technology (ICT) in adapting library services for the developmental countries is a double-edged sword. On the one hand, the digital revolution can potentially create a more just society by providing equal access to education resources, closing gaps in educational opportunities, and promoting lifelong learning; on the other hand, it reveals the still existing gaps in structural conditions, digital competency, and the political front. Bridging these differences asking for a wise choice of leaders who are ready for coordinated actions, involving different stakeholders, and a comprehensive approach in organizing the engagement of local communities, training, and solid policy. Services provided with the use of ICT in libraries should go further than just the use of technology. They should cater to those without internet access and should adapt many the multiple modes of learning. The main idea behind these developments is to turn the library not only into a physical storage for resources, but rather into a digital knowledge center. ICT-enabled libraries can serve as the cornerstone for the formation of an information society, participation, and being able to use digital technologies as tools that will empower people the input for development in the modern era.

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