

# A Study on Impact of Digitalization on Library System

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## Abstract

*The process of making historical and other artefacts accessible online is referred to as "digitalization." Information items undergo digitization when they are transformed from analogue to digital form. Books, papers, and manuscripts are digitized when they are transformed into an electronic format, specifically an image format, that can be read by machines. Any user, from any location, may easily access digitized content, and several users can share a single document at the same time. The delivery of library services has been substantially revolutionized by digitalization, making them more effective, accessible, and user-friendly. This change has made libraries more important in the information society and has enhanced their operations, positioning them as key players in the diffusion of knowledge in the digital era. This paper aimed to review the past literatures to grasp a better understanding of the digitalization of library science.*

**Keywords:** Digitalization, Library science, digital library, library users, digital literacy

## INTRODUCTION

Currently, digitalization and digital libraries are buzzwords among all Indian information professionals. Experts in the fields of library and information science first broached the topic of automating library operations only fifteen years ago [1]. Innovations in data storage and processing, communication tools, electronic goods, networking, and internet use have caused a dramatic change in library operations. Indian libraries started digitizing in the 1980s, although at first it was only for building bibliographic databases and basic housekeeping [2]. The first phase included digitizing bibliographic catalogue entries; however, this has since been extended to encompass the digitization of whole texts, photos, audio, video, and more. Even among those who work in the subject of library and information science, there is a lot of confusion about the many types of libraries that have arisen due to the merging of computer and communication technologies.

## Digitalization of Libraries

Online access to a variety of information is made possible by digital libraries. You may access these resources from any location with an internet connection. They include databases, academic publications, and e-books. Consequently, consumers may access and make better use of information faster and more conveniently, all without leaving the comfort of their own homes [3].

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The last few decades have seen a meteoric rise in the development of digital libraries in India. The transition has been greatly aided by government programs and money [4]. Libraries have begun to improve their digital infrastructure via the establishment of programs that help them acquire the technology and resources they need.

The current digitization trends in libraries are all about making the user experience better. The efficiency of information retrieval is being greatly

enhanced by several libraries via the implementation of user-friendly interfaces and powerful search functions. Videos and interactive material are examples of multimedia resources that may improve the user experience [5].

Many obstacles still stand in the way of full digitization, despite its many advantages. Investing in new technology might be challenging for libraries due to budget restrictions. On top of that, not all library employees will need specialized training to help patrons and make good use of digital resources. To make sure people can easily utilize internet systems, we also need to fix problems with their digital literacy [6].

### Historical Evolution of Library Digitalization

Library digitization on a worldwide scale has been an ever-changing path throughout history, shaped by changes in technology, society demands, and how people consume knowledge. There have been several major changes in the way libraries function and the services they provide to the public during this growth [7].

### Types of Digital Libraries

Digital libraries are categorized based on their content and the way they operate. Here's an overview of the main types: [8]

#### *Institutional Repositories*

These are digital libraries created by institutions (like universities or research centers) to store, manage, and distribute their academic resources such as theses, dissertations, and research papers.

#### *Subject-Specific Digital Libraries*

These focus on particular subjects or disciplines, housing specialized collections in fields such as medicine, law, or engineering. Examples include PubMed for medical research and arXiv for scientific papers.

#### *National Digital Libraries*

National-level libraries digitize cultural heritage, government publications, and other national resources. India's **National Digital Library of India (NDLI)** is one such example, providing a wide array of resources for educational and research purposes.

#### *Public Digital Libraries*

These libraries aim to provide free access to resources for the general public, often including digitized books, music, videos, and other media. Examples include **Project Gutenberg** and the **Internet Archive**.

#### *Hybrid Libraries*

These libraries integrate both digital and traditional resources, offering access to both physical and electronic materials.

Table 1 Historical evolution of library digitalization

Phase	Period	Key Characteristics
Pre-Digital Era	Before the 1980s	Traditional cataloging using card catalogs
		Limited accessibility, requiring physical presence in libraries
Emergence of Automation	1980s to Early 1990s	Introduction of Library Management Systems (LMS)
		Online Public Access Catalogs (OPACs) for digital searching
Growth of Digital Libraries	1990s to Early 2000s	Launch of digital library initiatives
		Government and institutional support for digitization efforts

### **Digital Archives**

These libraries focus on preserving historical documents, rare manuscripts, and cultural artifacts in digital form, ensuring long-term access and preservation.

### **Benefits of Digitalization for Library Users and Staff**

Due to the advent of digitization, libraries have become much more inviting, efficient, and accessible to the general public. By bringing about a comprehensive shift in the manner in which data is stored, accessed, and shared, this modification has made it possible for users and workers alike to take advantage of new opportunities [9]. Users of the library are no longer restricted by their physical location since digital resources have made it possible for them to browse through large collections whenever and wherever they desire. Because of this, the resources of libraries are made available to members of the general public, not only students and academics, so that they may be accessed and used anytime and wherever they want. At the same time, those who work in libraries benefit from streamlined processes since it enables them to dedicate more time to interacting with customers and providing support. The use of digitalization results in an atmosphere that is more friendly and flexible inside the library, which ultimately enhances the experience for all parties involved [10].

### **Challenges Faced in the Digitalization Process**

Several obstacles lie on the path that libraries must travel on their way to digitalization. Even while digital technologies provide a lot of potential advantages, such better information access, better user experiences, and more operational efficiency, many libraries have problems that make it hard to employ them [11].

### **Current Trends and Technologies in Library Digitalization**

Embracing new technology to enhance their services, libraries are swiftly adjusting to the constantly evolving digital landscape. Numerous advancements in library digitization have been spurred by changes in people's information access, distribution, and consumption habits in Karnataka and across India. In addition to improving the user experience, these trends help make libraries more efficient [12].

### **Integration of Artificial Intelligence (AI)**

Library services are being revolutionized by artificial intelligence. Search capabilities, cataloging automation, and user interactions are all being enhanced with the help of AI technology.

Table 2 Challenges Faced in the Digitalization Process

<b>Challenge</b>	<b>Implications</b>	<b>Potential Solutions</b>
<b>Financial Constraints</b>	Investments in hardware, software, and training programs are restricted by restricted budgets.	Investigate other financial options, such as grants, collaborations, and community support.
<b>Lack of Technical Expertise</b>	Staff may encounter difficulties in effectively managing and implementing digital services.	Prioritize ongoing training programs and collaborate with educational institutions for skill development.
<b>Cultural Resistance</b>	Hesitancy to embrace new technologies can hinder adoption of digital services.	Implement change management practices and engage users through workshops and demonstrations.
<b>Privacy and Security Concerns</b>	Risk of unauthorized access and data breaches, leading to user distrust.	Establish strong cybersecurity measures and clear privacy policies to protect user data.
<b>The Digital Divide</b>	Disparities in access to technology lead to unequal utilization of digital resources.	Provide access to computers, internet services, and digital literacy training to underserved communities.
<b>Future Challenges in Digital Development</b>	Rapid technological advancements and changing user expectations require constant adaptation.	Stay updated with trends, explore emerging technologies, and enhance user experiences through intuitive interfaces.

### ***Adoption of Cloud Computing***

Through the use of cloud computing, libraries are able to handle and store enormous amounts of data without having to make significant investments in equipment that is located on the premises.

### ***Development of Mobile Applications***

As the usage of smartphones and tablets continues to skyrocket, more and more libraries are developing mobile applications to make their collections and services more accessible on the go [13].

### ***Open Access Initiatives***

Academic research and publications are increasingly being made freely available to the public via the open access publishing trend. There has been a recent uptick in the number of libraries that support open access by facilitating the free dissemination of research results.

### ***Digital Preservation Strategies***

Libraries are realizing the critical need of digital preservation measures as they digitize their resources. This necessitates the development of strategies to preserve digital resources for future use [14].

### ***Utilization of Big Data Analytics***

Libraries are now able to collect and analyze vast quantities of user data with the assistance of big data analytics in order to more effectively serve their patrons.

### ***Virtual Reality (VR) and Augmented Reality (AR)***

A fascinating new trend is emerging: libraries are starting to use virtual reality and augmented reality. With the help of these technologies, users may immerse themselves in digital archives or interactive learning sessions, for example.

### ***User Awareness and Digital Literacy***

For digital library systems to be effectively adopted and used, user awareness and digital literacy are essential. They are crucial in making sure that people can utilize digital libraries properly and that they know what to look for and how to find it. All the cutting-edge digital library systems in the world won't be able to help those who lack proper digital literacy [15].

The term "digital literacy" describes a person's capacity to efficiently locate, assess, produce, and share information using various forms of electronic media. Academic article searching, e-book access, digital tool usage, and active participation in online learning settings are all part of what is meant by "digital literacy" as applied to digital libraries. There may be a learning curve associated with these new types of information retrieval for many users, particularly those without technical training or extensive experience with digital platforms [16].

## **LITERATURE REVIEW**

The storage, management, and retrieval of user-requested, relevant materials becomes more challenging as the quantity of papers in digital libraries increases. This goal inspired the creation of a DLMS, or digital library management system, accessible over the World Wide Web. As a result, an infinite amount of digital information may be created and made accessible to the globe simultaneously. The goal of the system is to collect research materials for the school and make them available to users even in rural locations. The design criteria include the following: database type: MYSQL; programming languages: Java, PHP, and HTML. This system is created to be both user-friendly and capable of managing material. Data input, validation, and updating are the purview of the content management system, whilst system interaction with users is the purview of the interactive system [17].

In their study, the writers emphasized the role of digital libraries in the evolving world of global information. According to the study's findings, a digital library is one that makes its collection of books,

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periodicals, and other reference materials available online. Users, in their roles as information creators and consumers, may take use of the myriad services and functionalities made possible by technological advancements. Digitizing information makes it simpler to maintain access and distribute it, which in turn impacts library services in this digital age. Additionally, compared to a conventional library, the expense of keeping a digital library is far cheaper. In India, the transformation of library services began twenty years ago, and since then, the nation has been hit hard by a wave of digital transformation, with at least 800 libraries transformed into Digital Libraries. However, India must exert all necessary effort in this area via deliberate and methodical planning [18].

Researchers at Bangladesh's East West University looked at what made students use digital libraries. 129 users of the East West University Digital Library (EWUDL) were surveyed using questionnaires and data was gathered via observation. Intention to use, perceived utility, perceived simplicity of use, system characteristics, service quality, users' knowledge of the search domain, and the quality of the digital library's material were some of the elements that affected the utilization of the digital library, according to the results. There is a strong correlation between the perceived utility and simplicity of use of a digital library system and the intention of users to utilize that system. When it came to EWUDL, users were generally pleased. Many difficulties were highlighted in the research as being associated with the implementation of a digital library system at a university in Bangladesh. There are some recommendations regarding the country's use and acceptance of digital libraries [19].

Digital libraries, a database that can be kept and accessed via online networks, have been the subject of significant growth, according to the study. Digital libraries are the most advanced kind of information system, supporting distributed database administration, hypertext, filtering, information retrieval, and selective distribution. Thanks to dispersed networks, this has really broken down geographical barriers by making available a wealth of multimedia-enhanced academic, scientific, and cultural materials. The article looked at the idea of a digital library, the technology that made it possible, and the design of a digital library system. It also features digital library initiatives in India, the United Kingdom, and the United States. In this piece, the writers delved into what makes a digital library special, as well as some of the difficulties that librarians and information science experts may face in the future [20].

Through an examination of the benefits and potential pitfalls of digital libraries as an educational infrastructure, this study sought to illustrate the significance of digital libraries for its potential use in university libraries. A literature evaluation based on a selection of empirical research materials was used to carry out the inquiry. The proliferation of digital libraries is a direct result of the lightning-fast pace of technical advancement across all industries, including the library. There are several ways in which digital libraries improve upon more traditional forms of library research and instruction for educators. Traditional libraries are invaluable due to their many benefits, but digital libraries fill a need that cannot be filled. While digital libraries have numerous benefits, they also face many challenges, including concerns with infrastructure, digitizing collections, copyrights, human resources, and cost. Library directors at universities that implement digital libraries will face these same problems in the future. According to the findings, digital libraries will never be able to replace traditional libraries [21].

There is still something antiquated about the "digital library" viewpoint, even if it is foreseeable due to current library structures. Costs, technology, legal concerns, and the management of "digital libraries" all work against realizing this outmoded paradigm dream. It seems weird to be discussing how to improve digital libraries at this early stage, considering how young the sector is. In this dynamic setting, however, virtual collections and digital libraries created via digitization initiatives are constantly evolving to meet the needs of users and new technological developments. In the middle of all this chaos, it would be wise to assess what the users want and need from the digital library and then find a Knowledge Organization System to meet their demands. Digital librarians may take use of the network environment to provide more value to library patrons by expanding the digital library's structure beyond its original setup [22].

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The authors have outlined the important events in the evolution of digital libraries, illustrating how they have developed to meet patron needs and technology. The research found the initial stage in which distributed repositories improved by tracing their technical origins to the Dienst system. This accomplishment with the Open Archive Initiative led to a new approach to integrating frameworks and technologies. Interoperability is used by digital libraries worldwide to exchange content. Digital libraries grew in institutions that couldn't create their own. Digital Library Management Systems enabled this. Digital Library Management System Initiatives like Cyclades and Scholnet have been paving the way for new digital library thinking since 2000, when the notion of collaborative digital libraries emerged. Finally, digital library researchers face e-Infrastructures, Virtual Research Environments, and Ecosystems. The chapter finishes with a discussion of the digital library's societal impact. For two main reasons, it has focused on scholarship and historical and contemporary scientific research and development events [23].

The research looked at the pros and cons of using digital technology in academic libraries from the perspectives of both library patrons and staff. The Panteion University Library and the Central Library of T.E.I. of Athens were the locations of the research in Greece. For this study, we formulated two research questions and surveyed 55 people from the Panteion University Library and the Central Library of T.E.I. of Athens: 39 library customers and 16 librarians. The survey found that both library users and librarians generally had a positive impression of the Panteion University Library and Central Library of T.E.I. of Athens' digital materials, E-resources, and services. Users were pleased by the digital materials' convenience and the academic libraries' E-resources' availability, including the Web, WIFI, and online databases. Both the library's technology (computers) and its personnel failed to meet their expectations. The findings also revealed an increase in the use of services like the Open Public Access Catalogue and e-mail. Academic library funding, staffing levels, and the digital library system were all areas where librarians expressed dissatisfaction. Everyone from academic institutions' upper echelons to library directors and staff to library patrons and scholars as well as the general public stands to benefit from this study's findings [24].

A digital library was defined and its architecture for supporting access to digital materials and services was detailed in this article. To put it simply, a digital library is an online system that offers access to a diverse range of items and services. Articles, abstracts, and licensed databases of journals, photos, and videos are all part of the contents, as are descriptions of physical collections and a wide variety of electronic media. Reference and referral services, instructional services, services with additional value, and promotional services are all available via Digital Libraries. While the specifics of how these services work could differ, they all have the same general goal of assisting patrons with research [25].

The removal of physical location and time restrictions is the first of many potential social advantages of digital libraries, which hold great promise for online education in the modern mobile age. Given that librarianship is one of the service industries most touched by information technology, it is imperative that those working in the field get this expertise. The characteristics, benefits, drawbacks, and functions of digital libraries are discussed in this study, which also provides an outline of recent developments in digital library research. Also discussed in this study is how the rise of digital libraries has altered the role of more conventional reference materials [26].

In order to meet the needs of its patrons, a library may acquire materials from a wide variety of sources. All of these materials had comparable purposes in the pre-digital era's paper-based world, when copyright limits were based on page counts and other metrics. In the 1990s, there was a meteoric rise in both research and practice for Digital Libraries. There is a proliferation of conferences, journals, and internet news lists, and libraries are actively participating in DL initiatives with substantial financing. The paper looked at why these developments are necessary, what digital libraries are and how they work, the steps involved in digitizing documents, their benefits and drawbacks, some Digital Library Initiatives in India, and some significant Digital Library Software Packages [27].

## CONCLUSION

Most studies on library digitalization focus on general trends, challenges, and advancements but often overlook specific operational issues and user interactions. While some research addresses user satisfaction and the overall benefits of technology in libraries, very few explore the unique challenges faced during the digitalization process. Issues such as limited resources, inadequate staff training, and insufficient technological infrastructure remain underexplored, leaving significant gaps in understanding the complexities of digital transformation in libraries. The impact of digitalization on library services and user satisfaction has not been comprehensively analyzed in many contexts. Libraries play a critical role in fostering access to knowledge and supporting community development, making it essential to understand how technology influences their service delivery and user experiences. Existing research often does not account for the practical challenges that arise, such as disparities in access to digital tools, marketing of services, and maintaining the infrastructure needed for seamless operations. It also underscores the importance of tailored strategies for improving service quality, operational efficiency, and user engagement. By focusing on the operational dynamics and user perspectives, studies can offer actionable insights into how libraries can adapt to the digital age while overcoming the challenges that come with it. This understanding is key to ensuring that libraries remain effective, inclusive, and responsive to the changing needs of their users.

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