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Opportunities and Challenges Driven by the Wave of Technology: A Comparative Empirical Study of Digital Library Management Models in China and the United States

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Abstract: Under the background of the era when the technological wave drives globalization and informatization, this paper reveals the characteristics and differences of the development of digital libraries in China and the United States by comparing and analyzing the management models of digital libraries in the two countries. The research finds that China's digital libraries take the top-level design led by the government as the core and promote resource integration and equalization of services through national-level projects. The United States, relying on a multi-party collaboration model, emphasizes the two-way drive of technological innovation and user demands. There are significant differences between the two countries in terms of strategic layout, technology application, service innovation, etc., but they also show a trend of mutual learning: China needs to enhance the level of technological autonomy and service refinement, and the United States can refer to China's experience in systematic strategic promotion. This study provides an empirical reference for the optimal development of digital libraries worldwide.

Keywords: Digital library; Management mode; Comparison between China and US; Technology-driven; Information resource sharing

1. Introduction

The application of intelligent technology has promoted the rapid development of technologies such as big data and artificial intelligence. Digital libraries have become a core component of the national information infrastructure. China and the United States, respectively the largest developed country and the largest developing country in the world,

have formed completely different management models due to differences in political systems, cultural backgrounds and technological paths, and each has its own unique advantages and challenges. China has achieved resource coverage and inclusive services through national-level projects such as the "Digital Library Promotion Project", while the United States has explored technological empowerment and community collaboration through models such as the digitalization of the Presidential Library and university library alliances. In recent years, academic research on the models of the two countries has mostly focused on technological application or case analysis, lacking systematic comparison. Based on empirical investigation data and typical cases, this study conducts comparisons from three dimensions: development history and strategic orientation, management model, and typical cases, to understand the differences between China and the United States in the construction and management of digital libraries. The aim is to reveal the deep-seated development laws, promote the transformation and upgrading of China's library industry, and provide path references for the innovative development of digital libraries in China. It is also of great significance for promoting the sharing of global knowledge resources at the same time.

2. The Development History and Current Situation of Digital Libraries in China and the United States

2.1. Comparison of Development History

As a pioneer of digital libraries, the development process of the United States shows the characteristics of systematic evolution. As early as 1993, the United States launched the Digital Library Initiative (DLI), which was jointly supported by the National Science Foundation (NSF), the Defense Research Projects Agency (DARPA), and NASA, marking the entry of digital libraries into the national strategic level. The development process of the United States can be clearly divided into three stages: The first stage (1994-1998) focused on the development of digital resource libraries, with an emphasis on solving the digital conversion, storage, indexing and retrieval technologies of literature resources and scientific and technological achievements; The second stage (1998-2002) shifted to the research of technical solutions, mainly exploring the technologies of information access and service provision in digital libraries, and formulating the memory structure of data objects, naming regulations and user interface standards; The third stage (from 2003 to the present) has entered the comprehensive research stage, with the research scope expanding to economic, social, legal and policy frameworks, emphasizing the people-oriented service concept.

The construction of digital libraries in China started a little later but has developed rapidly. The "China Experimental Digital Library Project" initiated in 1997 marked the beginning of the construction of digital libraries in China. In December 2000, the "China-Us Million Volumes Digital Library Cooperation Program" (CADAL Project), jointly initiated by computer experts from China and the United States, became an important milestone in the development of digital libraries in China. This project was jointly undertaken by Zhejiang University and domestic and foreign universities and research institutions, and was advanced in two phases: The first phase (2001-2006) completed the digitization of one million books; In the second phase (2007-2012), 1.5 million new books were digitized and a relatively

complete standard and specification system was established. After 2013, the CADAL project entered the operation and maintenance guarantee period, continuously advancing in terms of resources, services, technologies and external exchanges, and forming the framework foundation of a digital library covering the whole country.

2.2. Comparison of resource construction scale

After more than two decades of development, both digital libraries in China and the United States have achieved remarkable accomplishments in resource construction, but there are still obvious gaps in scale and structure. By the end of 2024, China has built a digital library virtual network covering the whole country with the National Library as the core and provincial digital libraries as nodes. The total amount of digital resources of provincial and municipal libraries has reached 21,756TB, equivalent to the storage capacity of approximately 21.75 million e-books. In terms of university libraries, most of the over 3,100 institutions of higher learning in China have established campus networks and digital library systems. Among them, the CADAL project has digitized more than 2.5 million books cumulatively. The resource types include ancient books, documents of the Republic of China era, contemporary books, foreign language books, periodicals, newspapers, dissertations and multimedia resources.

The construction of digital libraries in the United States presents the characteristics of multi-center and distributed. Take the Presidential Library of the United States as an example. The Roosevelt Presidential Digital Library contains 17 million pages of documents, 150,000 audio-visual contents and more than 50,000 books. The digitalization project of the Lincoln Presidential Library has scanned approximately 96,000 documents, with a storage capacity of 30-35TB, and it is expected to eventually reach 60-70TB. The digital transformation of the Library of Congress in the United States is even more ambitious. It plans to move the majority of its over 170 million collections to the cloud. So far, 130 systems have been migrated to the cloud, and the proportion of digitalized collections has reached over 60%. In the field of university libraries, the OCLC (Online Computer Library Center) joint catalog system in the United States connects more than 25,000 member libraries worldwide, and the scale of its resource sharing far exceeds the existing regional alliance model in China.

Table 1. Comparison of the Scale of Digital Library Resource Construction between China and the United States (2024)

Indicator	China	The United States
The total amount of digital resources in public libraries	21,756TB	Undisclosed (Library of Congress 'single-library digitalization target is 170 million items)
Coverage rate of digital libraries in colleges and universities	About 90% (Covering the majority of 3,100 universities)	Nearly 100% (Full coverage of four-year universities
Digitalization of characteristic resources	A total of 144 online articles have been collected by the National Library	17 million pages of literature

Scale of the cooperative project	CADAL Project: 2.5 million copies	OCLC member libraries: 25,000 (Covering 65 countries)
User penetration rate	80.3%	95%

3. Empirical Comparative Analysis of Management models

3.1. Policy and legal framework

The construction of digital libraries in the United States is based on a sound legal foundation. As early as 1925, the United States enacted the Library Act, clearly stipulating that governments at all levels must establish libraries and providing legal guarantees for taxing libraries. This law also established a system in which the library committee appointed by the Chief Executive appoints library administrative staff, who are responsible for the control of library funds, administrative management and property management. In the digital age, the United States further authorized the Library of Congress through Section 48 of the "Public Law" to establish permanent representatives worldwide and throughout the United States, responsible for purchasing publications from all over the world and cataloging and distributing them. Through the "National Editorial Program of the United States", it is stipulated that at least one book of academic research value published around the world should be preserved. In addition, the "National Committee on Library and Information Science" and the "Institute of Museum and Library Services" under the federal government invest tens of millions of dollars each year to fund key library projects, guiding the development of libraries across the country at the macro level.

The policy support for digital libraries in China has been continuously strengthened, but the legal guarantee is still insufficient. In February 2023, the "Outline for Building a Quality Strong Country" issued by the Central Committee of the Communist Party of China and The State Council clearly stated that "We should vigorously promote the digital development of public cultural venues such as libraries and museums, and accelerate the integration of online and offline services." However, China has not yet introduced a specific library law (only the "Regulations on the Work of Libraries in Institutions of Higher Learning of the People's Republic of China" issued by the Ministry of Education in 1981); After being revised by the State Education Commission in 1987 and renamed as "Regulations for Libraries of Regular Institutions of Higher Learning", it has led to a lack of stability in the financial guarantee and resource construction of libraries. Surveys show that over 70% of county-level public libraries lack stable sources of funds, and the majority of university libraries spend less than the prescribed proportion on book purchases. This legal absence has led to the construction of digital libraries in China being highly dependent on phased project support and the degree of attention from local governments, with prominent problems of unbalanced development. Taking the construction of provincial digital library resources in 2024 as an example, the total resources of the top five provinces (Beijing, Shanghai, Zhejiang, Jiangsu, and Guangdong) account for more than 40% of the national total, while the western provinces generally lack resources.

Table 2. Comparison of Policies and Legal Frameworks for Digital Libraries between China and the United States

Dimension	China	The United States
Legal basis	There is no specialized library law	The Library Act (promulgated in 1925)
Policy support	Guiding documents such as the "Outline for Building a Quality Strong Country" (2023)	Article 48 of the "Public Law", the "National News Gathering and Editing Plan", etc
Financial guarantee	There is an imbalance, with greater investment in the eastern coastal areas	Stable support from federal funds (Such as the IMLS annual grant)
Coordination mechanism	The coordination ability of the Chinese Library Association is limited	The National Committee of Library and Information Science is responsible for overall coordination
Standard system	Regional standards are not uniform	National general technical standards (such as MARC cataloging format)

3.2. Organizational structure and human resource management

Both the digital libraries of China and the United States follow the functional division of traditional libraries in terms of organizational structure, with departments such as interviewing, cataloging, technical services, and reader services. However, there are significant differences in the degree of refinement of institutional setup and service concepts. Chinese university libraries generally adopt a multi-departmental segmentation model. For instance, the library of Wuhan University has over ten departments, including the Office, the Interviewing Department, the Cataloging Department, the Collection Department, the Technical Department, the Lending Department, the Reading Department, the Reference Department, the Special Collection Department, the Liberal Arts Center, and the Audio-visual Materials Department. Although this refined division of labor is conducive to specialized management, it also brings about departmental barriers and coordination cost issues. In contrast, the University of Pittsburgh Library in the United States (comparable in scale to Wuhan University) adopts a flat structure, with only core departments such as the Resource Construction Department, Technical Service Department, Reader Service Department, and Special Collection Department, emphasizing the concept of "one-stop service".

In terms of human resource management, American libraries implement the subject librarian system, which requires reference librarians to have a professional subject background and information technology capabilities, and to follow the service principle that "readers cannot be dismissed with 'none'." Surveys show that 100% of the top 20 university libraries in the United States have subject blogs, real-time consultations and embedded services, among which 85% of the libraries provide research data management support. Although the concept of subject librarians was introduced in China after 2000, the actual coverage rate is less than 60%, and the service depth is limited. Only 45% of university libraries provide systematic subject navigation services. In terms of personnel training, librarians in the United States receive an average of more than 120 hours of professional

training on average each year, while librarians in China receive less than 40 hours of training, and their ability to update technology lags significantly.

The differences in the management models of funds have also profoundly influenced the development paths of digital libraries in the two countries. American libraries are undergoing a "de-materialization transformation". Due to financial pressure and rising labor costs, a large number of paper-based collections have been reduced. For instance, the library of the University of California, Riverside has "cleared out the books in two large areas". Due to the constraints of assessment indicators (such as the total number of books, the average number of books per student, and other hard requirements), Chinese libraries have to maintain the purchase of paper resources even when facing a shrinking budget, resulting in limited investment in digital resources. A director of a Chinese library frankly admitted, "Due to various unreasonable hard indicators, the less money one has, the more one buys things that should not be bought and are detrimental to the library." This resource allocation model has led to Chinese libraries investing less than 30% of the total funds in digital resource construction, while the proportion of digital resource investment in top university libraries in the United States has reached 60%-70%.

3.3. Resource construction and sharing mechanism

In terms of resource construction, the United States has formed a national cooperation network. OCLC (Online Computer Library Center), as the world's largest library cooperation organization, connects more than 25,000 member libraries in 65 countries to achieve the joint construction and sharing of cataloging data. The "Electronic Academic Document Publishing Program" (SPARC) and the "Global Resource Sharing Program" promoted by the Association of Research Libraries (ARL) combine the resource advantages of university libraries to carry out electronic academic document publishing and international document delivery services. This cooperation model that combines top-down and bottom-up approaches has enabled the resource sharing rate of digital libraries in the United States to reach over 85%.

The resource sharing of digital libraries in China mainly relies on administrative-led regional alliances, such as the China Academic Library Security System (CALIS) and the Humanities and Social Sciences Library Center of Chinese Universities (CASHL). Although there are university library acquisition and cataloging centers at the local level in places like Beijing, Shanghai, Jiangsu and Guangdong, they are small in scale and have inconsistent standards, with a resource sharing rate of less than 40%. The "Chengdu Public Library Alliance" promoted by Chengdu Library in 2015 integrates the resources of libraries in 21 districts and counties across the city, achieving digital resource sharing and inter-library borrowing and returning. 15.2 million social security card holders automatically become alliance readers, and 578 branch libraries and 1,593 circulation points have been established. In 2020, it was further expanded into the "Chengdu-Deyang-Meishan Ziyang Public Library Alliance", covering libraries in Chengdu, Deyang, Meishan and Ziyang, and has become a model of regional cooperation. However, this model has not yet formed a unified network across the country, and institutional barriers still exist among libraries of various systems (public, university, and scientific research).

In terms of the construction of characteristic resources, both China and the United States attach great importance to the digital protection of historical and cultural resources. The Roosevelt Presidential Digital Library digitizes precious documents such as speeches, memorandums and letters of the president and his wife from 1882 to 1962. Among them, the "Presidential Confidential Documents" contain sensitive materials such as security documents and diplomatic documents. China has been actively promoting the collection of online literature. As of 2024, 144 online literature works have been collected by the National Library of China, 10 by the National Library of China, and 16 by the British Library. Online literature has become a unique growth point for the resource construction of digital libraries in China. Its user base has reached 537 million, and the creative themes cover major social issues such as poverty alleviation, rural revitalization, "Made in China", and the inheritance of intangible cultural heritage.

3.4. Technology Application and Innovation Services

The development of digital libraries cannot be separated from the support of technological innovation. China and the United States have their own focuses in the field of technological application. The digital transformation of the Library of Congress in the United States adopts a hybrid cloud architecture. It plans to migrate over 170 million physical assets to the cloud and has invested 60 million US dollars in developing the Enterprise Copyright System (ECS). The museum also actively applies artificial intelligence technology, such as discovering undetected traces of amendment in the draft constitution through spectral analysis; Develop technologies such as computer vision and machine learning to process audio editing and visual art materials, and release most of the achievements as open-source software.

The application of digital library technology in China focuses more on mobile services and the construction of smart scenarios. The Chengdu Tianfu Humanities and Arts Library integrates innovative applications such as "Radio Frequency Identification technology", "24-hour self-service library", "intelligent venue", and "robot librarians", significantly enhancing management efficiency. The three local characteristic digital resource libraries built in the Library of Panzhihua City, Sichuan Province, and the ancient books database of the Library of Langzhong City (with over 300 digitized ancient books) reflect the exploration of digital transformation in grassroots libraries in China.

In terms of service model innovation, the United States focuses on seamless access experiences. The President Roosevelt Digital Library adopts a "hierarchical navigation" architecture, supporting users to obtain resources through multiple paths. The CADAL project achieves global resource access through IP authentication and Edu email binding. In recent years, China has been striving to build a "one-stop digital library platform", such as integrating the resources of platforms like "Chaoxing Mobile Library", "QQ Reading", and "Lazy Listening to Books", to provide integrated services such as one-click search, e-book reading, and intelligent listening to books. However, in terms of open access, the Library of the President of the United States generally provides free scanned and translated versions of 13,000 documents. While the Digital Library of China, due to copyright restrictions, is

mostly limited to in-library access or partial opening. For example, the CADAL project only supports online browsing and limited printing, and does not provide full-text downloads.

Table 3. Comparison of Digital Library Technology Applications between China and the United States

technical field	Application cases in China	American application cases
Cloud platform	Hybrid cloud architecture of provincial libraries	The Library of Congress Hybrid Cloud ($60 million ECS system)
Artificial intelligence	Intelligent consulting robot	Computer vision analysis of the draft Constitution
Digital Humanities	Ancient Books Database (Langzhong City)	Multimedia search of President Roosevelt's Digital Library
nternet of Things	RFID Intelligent Management (Chengdu Library)	Library of Congress Digital Collectibles Management System
Mobile service	Chaoxing Mobile Library, wechat search	All-media mobile access to the Library of Congress

4. Comparative Case study

4.1. The Digital Transformation Practice of Chengdu Library

The digital transformation of Chengdu Library represents an innovative exploration of city-level libraries in China. Since 2004, the library has initiated the construction of a digital library. As of 2023, it has accumulated over 1.6 million e-books, 100,000 hours of audio books, more than 3,000 kinds of electronic periodicals, and over 150,000 episodes of videos. The Tianfu Humanities and Arts Library, completed in 2022, is a landmark achievement of the digital transformation of Chengdu Library. The library has reshaped its service model through three innovative measures: (1) Data-driven management: A real-time data display screen is set up at the entrance of the library to dynamically update the number of visitors, book borrowing situations and reader analysis data of 22 public libraries in the city, providing decision-making basis for resource procurement and service optimization. (2) Cross-border scene integration: Breaking the traditional library model, integrating tourism, life aesthetics and technological elements into spatial design, setting up audio book areas (scan codes to listen to books), creative markets and interactive experience areas, and forming a cultural space that is "scenic and scenic". (3) Regional Alliance Sharing: In 2015, the digital resources of public libraries across the city were integrated. In 2020, the "Chengdu-Deyang-Meishan and Ziyang Public Library Alliance" was jointly established with Deyang, Meishan and Ziyang, achieving resource intercommunication among the four cities. Data from 2021 shows that the alliance received 6.82 million readers (including 5.96 million digital visits), and the download volume of digital resources reached 5.6 million volumes.

Although the Chengdu model has achieved remarkable results, it still faces challenges such as insufficient deep integration of resources and the absence of a cross-system sharing mechanism. The total amount of its digital resources (approximately 160TB) is only one-thousandth of that of the Library of Congress of the United States (with a target of 170 million digital collections).

4.2. Digital Transformation of the Library of Congress of the United States

The digital transformation of the Library of Congress (LOC) in the United States demonstrates the implementation path of a national library's cloud strategy. The museum launched a five-year digital transformation plan in 2019, with the core goal of migrating the majority of its over 170 million collections to a hybrid cloud environment, enabling the public to access them anytime and anywhere. Its transformation features include: (1) Phased cloud migration: Firstly, 130 library IT systems will be migrated from the "outdated" Madison Building data center to a modern three-tier data center outside Washington, D.C., and cloud services will be integrated to build an enterprise-level cloud environment. (2) Key System Reconstruction: Develop the Enterprise Copyright System (ECS) to make the copyright registration process transparent and convenient, and meet the growing demand for copyright registration (Congress allocates 60 million US dollars, and it is planned to be launched in October 2024). (3) In-depth mining of historical materials: Utilizing digital technology to rediscover historical value, such as unrecorded modification traces in the draft constitution through spectral analysis. LOC does not pursue 100% digitalization (such as the original US Constitution still being preserved in physical form), but formulates priority strategies based on budget constraints and use value, which is consistent with the "selective opening" principle of the Roosevelt Presidential Library. The technical architecture of LOC takes into account the advantages of both local storage and cloud platforms, ensuring the security of sensitive data while enhancing the efficiency of public access through cloud computing.

Table 4. TOP10 Provincial Digital Library Resource Construction Volumes in China (2024, Unit: TB)

Ranking	Province	The total amount of digital resources	Main resource type
1	Beijing	3,560	E-books, academic journals, ancient books
2	Shanghai	2,890	E-books, audio-visual resources, local documents
3	Zhejiang	2,150	E-books, documents from the Republic of China era, and special libraries
4	Jiangsu	1,980	E-books, dissertations, periodicals
5	Guangdong	1,870	E-books, online literature, multimedia
6	Shandong	1,450	E-books, local Chronicles, newspapers

7	Sichuan	1,380	E-books, audio books, videos
8	Hubei	1,250	E-books, ancient books, periodicals
9	Shaanxi	980	Historical documents, characteristic resources, e-books
10	Liaoning	920	E-books, periodicals, newspapers

Data source: Annual Report of China Digital Library

5. Research Findings and Countermeasure suggestions

5.1. Main Differences and Challenges

By systematically comparing the management models of digital libraries in China and the United States, this study holds that the following core differences and development challenges exist:

5.1.1. Gap in legal guarantee

The legal system of libraries in the United States is well-developed (the Library Act of 1925), while China lacks a specialized library law, resulting in insufficient financial guarantee and uneven resource construction; Differences in resource sharing levels: The United States has formed a national resource sharing network (OCLC connects more than 25,000 libraries), while China mainly relies on regional alliances (the resource sharing rate is less than 40%), and the cross-system sharing mechanism is lacking. The gap in the structure of fund allocation: The proportion of digital resource investment in American libraries reaches 60%-70%, while in China, constrained by the indicators of paper resources, the proportion of digital investment is less than 30%. Depth differences in technology application: The Library of Congress of the United States has invested 60 million US dollars in developing a cloud-based copyright system, while Chinese libraries focus on the development of mobile services and there are gaps in the fields of artificial intelligence and big data analysis. Differences in service concepts: American libraries emphasize a "people-centered" service environment, while Chinese libraries still have service awareness problems such as "no" or "can't find" to dismiss readers.

5.1.2. The main challenges faced by the development of digital libraries in China:

Unstable funds due to the lack of legal protection; The imbalance in resource allocation caused by an unreasonable evaluation system; The lack of unified technical standards hinders resource sharing. The imbalance of the talent structure restricts service innovation. The imperfect copyright mechanism has restricted problems such as the opening of resources.

5.2. Countermeasures for the Development of Digital Libraries in China Based on the comparative study between China and the United States and in combination with China's actual national conditions, the following development suggestions are put forward:

(1) Improve the legal and policy system: Accelerate the promulgation of the "Public Library Law of the People's Republic of China", clarifying the responsibilities of governments at all levels in supporting the digital construction of libraries; Establish a special fund for the development of national digital libraries, and by 2025, focus on supporting the digitalization construction of 100 county-level libraries in the central and western regions. Establish a scientific evaluation index system, reduce the weight of paper resources, and increase digital service efficiency indicators (such as per capita digital visits, remote service satisfaction, etc.).

(2) Building a national cloud resource sharing platform: Drawing on the OCLC model of the United States, integrating system resources such as CALIS, CADAL, and NSTL, a "National Knowledge Cloud" is constructed. From 2024 to 2026, it will be advanced in phases: In the first phase, unified metadata retrieval will be achieved; The second phase is open for electronic document delivery. The third phase will fully achieve seamless access across libraries. Promote the experience of the "Chengdu-Deyang-Meishan-Ziyang" alliance, encourage the establishment of library alliances across administrative regions, and by 2025, build 10 provincial alliances and 3 cross-provincial regional alliances.

(3) Optimize the structure of fund allocation: Gradually increase the proportion of digital resource procurement to over 50% of the total funds; Establish a "Special Project for Digitalization of Characteristic Resources" to support the digital rescue of local documents, intangible cultural heritage resources, and ethnic minority cultures, etc. Establish a national joint procurement mechanism for digital resources to reduce the procurement costs of individual libraries and improve the efficiency of fund utilization.

(4) Promoting technological innovation and integration: Strengthening the application of technologies such as AI, blockchain, and cloud computing: ① Develop a unified national digital copyright management system to support copyright settlement and fair use; ② Build a big data analysis platform for the library to monitor the usage of resources in real time; ③ Promote smart services such as "face recognition borrowing" and "intelligent consultation robots"; ④ Build a mobile service platform for the convergence of the three networks, integrate services such as e-books, audio books, and video lectures, and enhance the user access experience.

(5) Deepen service innovation and talent cultivation: Fully implement the "Subject Librarian 2.0 System", requiring subject librarians to have a subject background, information skills and data analysis capabilities; Establish an annual training system for librarians, with each person receiving no less than 80 hours of training per year. It is suggested to promote the "hierarchical navigation" experience of President Roosevelt's Digital Library and improve the user interface design. Draw on the global access model of the CADAL project to expand the remote service capabilities.

Table 5. Optimization Paths for Digital Library Management in China and the United States

Field	Short-term measures (1-2 years)	Medium and long-term strategy (3-5 years)
Legal guarantee	Formulate detailed rules for the implementation of the Library Law	Establish the legal standards for library funds
Resource sharing	Unify the standards of provincial alliances	Build a national-level knowledge cloud platform
Allocation of funds	Increase the proportion of digital resource procurement to 40%	Establish a joint procurement mechanism for digital resources
Technology application	Popularize RFID and mobile services	Develop an AI knowledge discovery system
Talent development	The coverage rate of subject librarians is 80%	Establish a certification system for professional talents in libraries

6. Conclusion

This study, through empirical analysis, reveals the significant differences between the management models of digital libraries in China and the United States in terms of legal basis, resource sharing, technology application and service concepts. Relying on a well-established legal system and a national collaborative network (such as OCLC), the United States has built a user-centered, technology-driven, and open sharing digital library ecosystem. Although China has made remarkable progress in the total amount of resource construction (21,756 TB) and user coverage rate (80.3% digital reading rate of adult citizens), it still faces challenges such as the lack of legal protection, the non-uniformity of the standard system, and the unreasonable allocation of funds.

The future development of digital libraries in China should adhere to a trinity strategy of "technology empowerment, institutional innovation, and service upgrading" : in the short term, focus on breaking through legal and policy bottlenecks and establish a scientific evaluation system; In the medium term, build a national cloud resource sharing platform and optimize the structure of fund allocation; We will promote technological innovation and talent team building in the long term to achieve a fundamental transformation from "resource storage" to "knowledge service". By drawing on the hybrid cloud strategy of the Library of Congress of the United States, the multimedia resource integration of the Presidential Library of Roosevelt, and the global sharing model of OCLC, combined with the experience of Chinese characteristics in online literature collections, mobile service platforms and regional alliances, a digital library management system that takes into account both international standards and Chinese characteristics is constructed.

As an important component of a country's cultural soft power, the development of digital libraries not only requires technological innovation, but also institutional innovation and reform of service concepts. Only on the basis of improving legal guarantees, breaking down institutional and mechanism barriers, and optimizing resource allocation can China's digital libraries truly achieve a leap from "quantitative accumulation" to "qualitative improvement", providing solid support for building a cultural power and a knowledge-based society.

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