

Comparative Analysis of Smart Services for Subject Resources in Chinese and American Academic Libraries: Postprint

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Abstract

Smart services for disciplinary resources represent a critical component in smart library construction. To promote the intelligent development of library disciplinary resource services, this article investigates the smart disciplinary resource services of 40 top-tier university libraries in China and the United States. Through literature research and web survey methods, it analyzes the current status and differences between Chinese and American smart disciplinary resource services across four dimensions: smart technology application, smart librarians, smart resources, and smart operations. The study offers insights for improving disciplinary resource smart services in Chinese university libraries through three approaches: innovative service models, reorganizing disciplinary resources, and empowering smart librarians.

Full Text

Comparative Analysis of Smart Subject Resource Services in Chinese and American University Libraries

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Abstract

Smart subject resource service constitutes a crucial component of smart library construction. To advance the intelligent development of library subject resource services, this study investigates the smart subject resource services of first-class university libraries in China and the United States. Employing literature research and network investigation methods, we analyze the current status and differences in smart subject resource services between the two countries across four dimensions: smart technology application, smart librarian, smart resource, and smart business. The study offers insights for improving Chinese university

library subject resource smart services through three approaches: innovating service models, restructuring subject resources, and empowering smart librarians.

Keywords: University library; Subject collection; Smart service

1. Smart Technology Application in Subject Resource Services

Smart technology application in subject resource services primarily manifests in two aspects: resource management and resource services. Both Chinese and American university libraries actively explore the use of artificial intelligence, augmented reality, and other information technologies to empower subject resources and enhance users' smart resource acquisition experiences. For instance, radio frequency identification (RFID) technology enables self-service borrowing and returning of print materials. Harvard University Library has established an augmented reality (AR) and virtual reality (VR) studio where users can explore different worlds using devices and headsets, developing teaching content with data and technology that provides new methods for interacting with materials, including profile visualization, surface curvature measurement, and multispectral analysis for academic research and teaching activities. Stanford University Library has launched an AI studio that processes internal information through AI applications, strengthening the discovery and analysis of collections. Tsinghua University Library began using consultation robots early on, while Nanjing University Library has developed book inventory robots and consultation robots. Nanjing University's new-generation library service platform enables immersive services, machine-assisted services, big data services, and spatial scenario services [23].

However, notable differences exist in the development and application of library smart management systems. American libraries demonstrate relatively mature application of smart technologies, particularly in cloud system and cloud service development. Many employ advanced library service platforms such as OCLC's WorldShare Management Services (WMS), a mature third-generation product fully based on cloud computing featuring cloud services, sharing, and other new applications. By contrast, most domestic library systems remain at the second-generation stage, such as Nanjing Huiwen and Shenzhen Ketu, which focus on traditional businesses like print resource retrieval and interlibrary loan. Some libraries are actively exploring self-developed systems; for example, Nanjing University Library has developed a new-generation smart library service platform (NLSP) with a redesigned interface [22].

2. Comparative Analysis of Smart Librarians

Smart service represents the embodiment and application of librarians' values and professional spirit in library work. As the main agents of subject resource

smart services, smart librarians must possess solid professional competence, extensive interdisciplinary research capabilities, broad international perspectives, and data application and processing abilities to meet users' high-level knowledge and resource needs [18].

Service Concepts and Modes

American university libraries exhibit stronger proactive service and user-led concepts in subject resource services. Survey results show that American universities invite faculty advisors or expert teams to participate in resource construction, accounting for a significant percentage, with librarians often being scholars themselves who actively participate in academic conferences and maintain exchanges with experts across fields. For example, Washington University in St. Louis encourages faculty to collaborate with subject liaison librarians, making librarians not just resource promoters but even leaders in subject resource construction [29]. In contrast, Chinese libraries' user participation in resource construction accounts for only a smaller percentage, with most interview librarians and subject librarians working separately and limited to one-way contact and resource promotion.

American subject librarians provide embedded services for research projects throughout their entire lifecycle, with approximately 100% coverage for such services. For instance, the University of Pennsylvania Library embeds professional knowledge throughout the full research lifecycle. Chinese libraries provide embedded project resource services for corresponding departments at a lower coverage rate. The differences in service approaches and relatively lagging service concepts among Chinese librarians result in lower smart service levels.

Team Collaboration

Under the paradigm of subject resource smart services, subject resource services involve cross-professional information resource screening and selection. Therefore, forming subject librarian teams for collaboration is essential, enabling the team to reflect individual librarian strengths while achieving complementary advantages to enhance overall service capabilities. American university libraries, composed of main libraries and specialized libraries, feature refined subject divisions. For example, Harvard University Library has 187 subject areas, Stanford University 221, Vanderbilt University 73, and Cornell University 81 [30]. Yale University Library has established a Department of Area Studies to support interdisciplinary research, while Duke University Library divides resources into multiple 细分 themes. This collaborative resource construction team structure highlights subject resource themes and characteristics.

Chinese university libraries have fewer subject interview librarians with relatively coarse subject domain divisions. For instance, one subject librarian at Tsinghua University Library is responsible for one or several colleges, with less refined subject area divisions [22]. The limited number of subject interview librarians and coarse divisions hinder the full revelation and utilization of subject resources.

Professional Qualifications

American subject librarians generally hold high academic degrees and scholarly influence, often possessing PhDs in non-library science fields. They have broad international perspectives and may be experts and scholars in various disciplines themselves, engaging in professional teaching and research work. They frequently attend relevant academic reports and even worldwide academic conferences, leveraging their profound professional knowledge to interview resources [25].

In contrast, Chinese interview librarians and subject librarians are mostly separate positions. Subject librarians themselves do not engage in teaching or research work and have relatively lower knowledge levels, academic influence, and professional competence. When facing literature resource interview tasks across multiple disciplines, they struggle to accurately grasp resource needs, and interview quality is difficult to guarantee.

3. Comparative Analysis of Smart Resources

Subject resource services must transition from literature provision-centered approaches to smart services, relying on the dual drive of technology and humanities to achieve orderly organization of collection resources and enable users to acquire knowledge resources intelligently [12]. Smart resources should fully utilize knowledge management methods to empower subject resources.

Thematic Characteristics

American university library subject resources feature distinct thematic characteristics. Specialized libraries have their own subject themes and conduct subject resource construction around these themes, making thematic features more prominent. For example, the University of Pennsylvania Library focuses on building collections related to Pennsylvania-specific topics such as German-Americans, mushroom production, chocolate and cocoa, and agriculture. Chinese university library thematic collections mostly develop from characteristic resources accumulated during the resource construction process. For instance, Tsinghua University Library's thematic collections are integrated from department branch libraries and reference rooms, while Tongji University Library integrates literature resources across the university to form themed libraries in marine and earth sciences and other areas.

Digital Empowerment

Digital empowerment of subject resources involves intelligent storage of resources through digital means, manifested as big data-ization of information resources [29]. Both Chinese and American university libraries possess vast quantities of diverse native data, such as collection catalogs, subject resource guides, institutional repositories, and open access resources. American libraries excel in the breadth and depth of digital services, with specialized digital departments equipped with advanced facilities that meet international standards, providing preservation, resource description, and retrieval (RDA) services. They

also support text mining and provide digital replicas for teaching and research.

Chinese university libraries lack professional digital service teams, typically relying on outsourcing for digitization. Their digital services are limited to special collections, with weaker overall smart capabilities [20]. Due to organizational structure limitations, Chinese libraries play only participatory or translation roles in the formulation of international library rules and standards, with limited professional discourse power.

Knowledge-Based Resource Organization

Knowledge-based subject resources employ knowledge management approaches to provide knowledge navigation and other services. High-quality subject resources should demonstrate broad dissemination of knowledge resources [29] and provide strong support for various service scenarios including scientific research, teaching, and curriculum construction. American university libraries provide multiple knowledge services using subject resources, such as institutional repositories that collect scholars and their academic achievements to provide archiving, retrieval, and open sharing for academic research. Subject information service portals allocate resources by discipline, offering subject development trends and disciplinary tools. The support scope and depth for various scenarios exceed those of Chinese libraries.

Chinese subject resources offer limited support depth for various scenarios, with relatively low service coverage. For example, in research data management, digital humanities, and other services, coverage rates are lower. Only a few libraries have conducted preliminary explorations, such as Zhejiang University Library's academic map publishing platform.

4. Comparative Analysis of Smart Business Supporting Service Scenarios

Support for Scientific Research Scenarios

American university libraries provide diverse services for scientific research using subject resources, incorporating data resources from laboratories and scholars into library management. For example, MIT's Data Management Services (DMS) provides data management, visualization, and analysis services throughout the entire research process. They offer research data management services, geographic information system (GIS) services, and digital humanities services. GIS allows users to process spatially referenced data layers to create maps and analyze spatial relationships.

Chinese library subject resources provide relatively single support for research scenarios, with low coverage in research data management and digital humanities services. Only a few university libraries have conducted preliminary explorations. For instance, Peking University Library mainly provides data organization, classification, and archiving services for researchers, while Tsinghua University Library offers research data retrieval, publishing, and dissemination consulting services.

Support for Teaching Scenarios

American university libraries embed subject resources into teaching activities, supporting customized courses by providing guidance and support to students and offering special collections for classrooms. For example, the University of Chicago Library provides tailored thematic courses for students with guidance and assessment. In teaching activities, Tsinghua University Library embeds literature retrieval and utilization content for specific courses. Chinese libraries mainly offer information literacy education courses or establish subject points to cultivate students' information literacy, with relatively single forms and limited service depth.

Support for Course Construction Scenarios

American university library support for course construction emphasizes user-centeredness and personalized course construction, supporting resource customization. Many libraries provide digital or physical course reserve services, where instructors place materials in digital reserves for dynamic updating and recommendation, ensuring 师生 can access relevant course resources anytime. They also create resource guides by discipline area and specific course.

Chinese university library support for course construction mainly consists of teaching reference book service systems, with coverage rates of approximately 60%. For example, Peking University's digital teaching reference system provides instructors with electronic resource customization services and self-owned digital resource upload functions, offering online access, reading, and annotation functions to enrolled students.

5. Enlightenments

Drawing on the advanced experience of American university libraries, this article offers the following enlightenments for developing smart subject resource services in Chinese university libraries:

Design Smart Solutions and Innovate Service Models

Technology empowerment has transformed library resource and service methods. To enhance overall library service capabilities and meet users' personalized and diversified needs, libraries must redesign services, operations, and functions from policy and institutional perspectives. For example, libraries should formulate hierarchical and gradient subject resource development policies based on institutional goals and disciplinary development plans, forming a balanced, orderly, and diverse subject resource service ecology [19]. Subject resource services should no longer be limited to passive literature provision but should embed resources into the entire processes of scientific research, teaching, and student cultivation, providing deep-level, customizable resource services for readers.

Leverage Smart Technology to Restructure Subject Resources

The application of artificial intelligence, user profiling, and other smart technologies enables effective integration, systematic revelation, and deep mining of subject resources, optimizing resource acquisition paths. Libraries can use data

visualization and other technologies to accurately cluster subject resources, provide thematic knowledge navigation, and meet readers' knowledge service needs. By empowering subject resources with smart technologies, libraries can enhance service standards while promoting humanistic spirit [33].

Empower Smart Librarians and Build Collaborative Teams

Chinese libraries should emphasize individual librarian capability development, providing professional and knowledge empowerment through training, and social and psychological empowerment through management to improve communication skills, collaborative experience, and psychological resilience [18]. On the basis of refined division of labor, libraries should increase professional librarians, invite experts from various fields to participate in resource services, and formulate smart librarian team development plans. This macro-level three-dimensional empowerment and reshaping of service teams can achieve a precisely positioned, steadily developing innovative collaborative capability system [12].

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