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Current Status and Analysis of Space Services in University Libraries: A Case Study of University Libraries in Guangzhou University City Postprint

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Date: 2023-08-27T00:00:00+00:00

Abstract

[Purpose/Significance] By investigating the current status of spatial services in university libraries of Guangzhou Higher Education Mega Center, this study summarizes their service characteristics and deficiencies, and proposes a framework and strategies for spatial services in university libraries.

[Method/Process] Using field investigation and questionnaire survey methods, this paper conducts an in-depth and detailed analysis of the current spatial services of ten university libraries in Guangzhou Higher Education Mega Center from four aspects: spatial type configuration, service facility construction, spatial reservation management, and spatial service reengineering, and constructs a service framework from four dimensions: spatial resources, facility resources, human resources, and service evaluation.

[Results/Conclusion] The spatial service strategies for university libraries are: formulate scientific development plans for spatial services; establish diversified service spaces; promote spatial services supported by information technology; and develop evaluation systems for spatial services.

Full Text

Space Service in Academic Libraries: A Case Study of University Libraries in Guangzhou Higher Education Mega Center

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Abstract

[**Purpose/Significance**] This study examines the current state of space services in university libraries within Guangzhou Higher Education Mega Center, summarizing their service characteristics and deficiencies, and proposes a framework and strategies for university library space services. [**Method/Process**] Through field investigations and questionnaire surveys, this paper conducts a detailed analysis of space services across ten university libraries in Guangzhou Higher Education Mega Center from four dimensions: space type configuration, service facility construction, space reservation management, and space service reengineering. A service framework is constructed from four aspects: space resources, facility resources, human resources, and service evaluation. [**Result/Conclusion**] The strategies for university library space services include: formulating scientific space service development plans; establishing diversified service spaces; promoting space services supported by information technology; and developing a space service evaluation system.

Keywords: space service; space type; service framework; academic library; Guangzhou Higher Education Mega Center

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Currently, the library community lacks a unified definition of "space service." According to Xiao Long, Director of Peking University Library, space service collectively refers to newly added spaces dedicated purely to services—such as creative spaces, learning spaces, communication spaces, and leisure spaces—that transcend traditional library spaces centered on collections and related services. These spaces, loosely connected to collections, aim to provide cultural venues for readers' learning, research, and exchange [1].

In the digital era, changing patterns of learning and knowledge acquisition have made space services a new trend in academic libraries. The 2017 *State of America's Libraries Report* published by the American Library Association advocates that academic libraries should reorganize or create new spaces to support individual and collaborative learning, noting that integrating new technologies, equipment, and research teams into library learning spaces facilitates multi-modal teaching and learning [2]. In China, the *Regulations on Academic Libraries* issued by the Ministry of Education on December 31, 2015, added provisions on "space service" to the 2002 revised edition, directing academic libraries to optimize service spaces with attention to user experience and service efficiency [3]. Consequently, space services in academic libraries have attracted widespread attention.

Existing research has examined university library space services from various perspectives: (1) **Space facility construction**: Yu Guoying argues that different space types should be equipped with appropriately styled furniture, bookshelves, and distinctive facilities, while increasing investment in self-service facilities to provide readers with novel operational experiences [4]. (2) **Space layout**

planning: Yang Wenjian suggests balancing space allocation between traditional collection-borrowing services and extended services; distributing space according to "optimal service effectiveness"; and creating dedicated spaces for disabled individuals based on actual needs [5]. (3) **Service evaluation**: Zhao Ping designed evaluation indicators from perspectives of physical environment, service quality, and staff competence, using the Analytic Hierarchy Process to weight each indicator [6]. Long Qian contends that university libraries should establish space evaluation committees and develop internationally recognized space assessment methods and indicator systems that integrate disciplinary service levels, user satisfaction, space utilization rates, and economic benefits [7]. (4) **Space service framework**: Guo Haiming proposes that the space service system comprises an environmental support layer, resource provision layer, and knowledge innovation layer. The environmental support layer integrates external library environments, organizational structures, and technical elements; the resource provision layer refers to various information resources; and the knowledge innovation layer, the core layer composed of physical and virtual spaces, includes research rooms, rest areas, and information exchange zones [8]. Ren Shuhuai et al. constructed a space service model for information commons featuring physical, virtual, and humanistic environmental elements [9].

Based on these understandings, this study comprehensively investigates space types, service facilities, space reservations, and space reengineering in university libraries within Guangzhou Higher Education Mega Center. By summarizing service characteristics and deficiencies, it offers practical guidance for libraries developing space services and sharing successful experiences. Finally, by articulating a space service framework, this paper proposes strategies for university library space services to provide foundations and references for implementation.

2. Survey Sample and Methodology

To investigate space services in academic libraries, this study selected ten university libraries in Guangzhou Higher Education Mega Center as subjects: Sun Yat-sen University, South China University of Technology, South China Normal University, Guangdong University of Foreign Studies, Guangzhou University, Guangdong University of Technology, Guangzhou University of Chinese Medicine, Guangdong Pharmaceutical University, Guangzhou Academy of Fine Arts, and Xinghai Conservatory of Music. These libraries feature relatively new buildings and equipment, with space planning that better meets user needs under new technological and service concepts, making them representative cases.

The study employed field investigation and questionnaire survey methods between October and November 2017. Field investigations documented and statistically analyzed space types, functions, and facility configurations. Questionnaires were designed around space management, space reengineering, and development planning, completed by ten librarians or library directors responsible for space services across different institutions to ensure accuracy.

3. Current State of Space Services in Guangzhou Higher Education Mega Center Libraries

Survey results reveal varying space service implementations across the ten libraries. The following analysis examines four aspects: space type configuration, service facility construction, space reservation management, and space service reengineering.

3.1 Space Type Configuration

As social civilization advances, university libraries have shifted their service philosophy and functions, moving from collection-centered to user-centered services. Statistics on space construction across the ten libraries reveal diverse spaces with different names, styles, and functions. “Space service” can be categorized into services provided in service halls, learning spaces, shared spaces, exhibition spaces, leisure spaces, and other distinctive spaces .

3.1.1 Service Halls

Service halls serve as the direct interface between libraries and readers, typically located on the ground floor to provide comprehensive guidance, circulation, reference consultation, and printing services. All ten libraries position their main service desks prominently in the hall. Some offer personalized services; for example, Guangzhou University of Chinese Medicine Library provides free convenience items such as charging cables, power banks, bandages, scissors, and stationery.

With advancing information technology, demand for self-service has increased. Seven libraries have established self-service areas in their halls, including self-service book borrowing/returning, printing/copying, and locker zones. These areas reduce routine workload and waiting times. Three libraries operate dedicated printing rooms staffed by personnel. To avoid copyright disputes, all libraries prohibit excessive or complete book copying.

3.1.2 Learning Spaces

Learning spaces provide quiet environments for reading, writing, and studying—the library’s “quiet zones.” These include reading areas, electronic reading rooms, individual study rooms, independent study halls, and 24-hour study rooms. All ten libraries feature reading areas with integrated collection and reading layouts, comfortable furniture, and accessible collections. Nine libraries provide electronic reading rooms for digital resource access, retrieval, and downloading.

Six libraries offer individual study rooms equipped with computers, bookshelves, and desks to create independent, quiet learning environments. Construction methods vary: Sun Yat-sen University Library’s rooms were planned during initial construction on floors 3-4 with independent doors and windows, while Guangdong University of Foreign Studies converted vacant areas using frosted glass partitions. Six libraries provide study halls, with Guangzhou University

Library's operating 24 hours. These halls typically feature U-shaped or linear partition desks for relative privacy.

3.1.3 Shared Spaces

Shared spaces accommodate readers' needs for discussion and knowledge sharing, providing venues for academic exchange, research innovation, interactive learning, thematic exploration, and project research to stimulate enthusiasm and latent skills while facilitating tacit knowledge conversion [10]. Current shared spaces primarily include lecture halls, meeting rooms, group study rooms, and book drifting stations, with six libraries offering lecture halls and group study rooms, and four providing book drifting stations.

Guangdong University of Technology's discussion spaces exemplify this model, comprising open and enclosed rooms. Open areas with configurable sofas and coffee tables accommodate 2-5 people for informal discussions, while enclosed rooms equipped with computers, electronic whiteboards, projectors, and office software support 6-12 person team presentations and demonstrations.

3.1.4 Exhibition Spaces

Exhibition spaces serve as information hubs for cultural dissemination, exchange, and activity promotion, bridging libraries and readers. These can be divided into two categories: traffic space exhibitions and dedicated exhibition spaces. All ten libraries utilize high-traffic areas like lobbies, corridors, and staircases for flexible, space-efficient displays.

Dedicated exhibition spaces are enclosed areas specifically allocated for exhibitions, including galleries, display rooms, and university history museums [11]. Seven libraries maintain such spaces: Guangzhou University of Chinese Medicine, South China Normal University, Guangdong Pharmaceutical University, and Guangzhou Academy of Fine Arts have dedicated galleries for reading promotion and exhibitions; Guangdong University of Foreign Studies, Guangzhou University, and Xinghai Conservatory of Music respectively operate university history museums, faculty publication display rooms, and Lingnan music culture exhibition halls. Xinghai Conservatory's "Lingnan Music Culture Exhibition Hall" showcases extensive collections of instruments, scores, recordings, and faculty compositions, effectively preserving and transmitting intangible cultural heritage.

3.1.5 Leisure Spaces

"Meeting members' cultural appreciation and entertainment needs" constitutes an essential library function [12]. Leisure spaces have become indispensable components of university libraries. All ten libraries provide reader rest areas, typically located along corridors, stairs, lobbies, or scenic viewpoints, furnished with soft sofas, coffee tables, plants, and artwork to create comfortable atmospheres.

Five libraries operate coffee bars—three inside library buildings and two adjacent to them. Beyond catering, these venues serve as important spaces for entertainment, learning, and social interaction. Guangdong Pharmaceutical

University Library's "Xishui Coffee Shop" regularly hosts book clubs, poetry recitals, literary salons, and holiday celebrations, allowing readers to engage in activities while enjoying beverages.

For diversified leisure experiences, some libraries have established specialized zones. Guangdong Pharmaceutical University offers a music appreciation room screening classic films based on reader votes, while Xinghai Conservatory Library's "Gramophone Bar" provides free music listening services via computers, headphones, and a dedicated terminal. The university also features a calligraphy practice area for experiencing traditional culture.

3.1.6 Distinctive Spaces

Diversified reader needs have prompted libraries to create distinctive spaces offering more choices. Examples include : - **Gift book reception points** (South China University of Technology): Receiving donated books for collection or book drifting - **Stationery 按需领取室** (South China University of Technology): Free stationery available on demand - **"Read Bar" audio reading room** (South China Normal University): Space for loud reading - **Self-service library** (Guangzhou University of Chinese Medicine): Unmanned space providing reading, self-service borrowing/returning, and printing - **Taoyuan special collection room** (Guangzhou University of Chinese Medicine): Multi-functional space for discussion, study, leisure, and events - **MIDI laboratory** (Xinghai Conservatory): Professional equipment and software for audio editing and music creation

3.2 Service Facility Construction

Libraries provide facilities to cultivate information literacy, enhance engagement, and improve space utilization, integrating reader services with space services. Guangzhou Higher Education Mega Center libraries primarily offer self-service equipment, service systems, and signage systems to enhance usability and support autonomous, convenient space usage.

3.2.1 Self-service Equipment

Self-service terminals reflect the functional shift toward service-centered operations, offering time-unlimited access, cost savings, privacy protection, and improved efficiency. Equipment types include: - **Self-service borrowing/returning machines** (7 libraries): Compact devices simplifying workflows and reducing waiting times [13] - **E-book borrowing machines** (7 libraries): Addressing copyright concerns while providing e-book access [14] - **Self-service printers and lockers** (over half of libraries) - **Portable readers, overdue payment machines, transcript printers, and book sterilizers** (fewer libraries) [Figure 1: see original paper]

3.2.2 Self-service Systems

Systems focus on space inquiry, reservation, positioning, and information dissemination: - **Space reservation and seat management systems**: Real-time status display and advance booking. Guangzhou University Library's system

includes seat selection, temporary leave, renewal, and violation recording functions, ensuring efficient utilization through established penalty mechanisms. - **RFID technology** (5 libraries): Wireless radio frequency identification for book and shelf labeling, enabling accurate location guidance, self-service circulation, and intelligent inventory management. - **LIDS (Library Intelligent Display System)** (2 libraries): Integrates new book announcements, recommendations, navigation, lecture information, and visitor statistics [15]. Guangdong University of Foreign Studies Library positions LIDS displays at elevator entrances on each floor [Figure 2: see original paper].

3.2.3 Space Signage Systems

Signage systems guide users and reveal spatial layouts, types, collection distributions, and service resources. Typically installed in service halls, staircases, and elevator areas, these systems comprise primary, secondary, and tertiary signs plus explanatory plates. All ten libraries provide primary signs and explanatory plates; seven offer secondary signs, while only three provide tertiary signs .

3.3 Space Reservation Management

Space reservation addresses personalized space service needs. Available space types and reservation methods vary across institutions.

Reservable spaces include individual study rooms, group study rooms, lecture halls, multimedia meeting rooms, and exhibition spaces.

Reservation methods include: - **On-site**: Manual forms (8 libraries) and reservation machines (2 libraries) - **Online**: Website portals (4 libraries) and WeChat services (2 libraries), overcoming temporal and spatial constraints .

3.4 Space Service Reengineering

During the survey period, three libraries—South China Normal University, Guangzhou University, and Guangzhou University of Chinese Medicine—were undergoing or had completed space renovations.

Renovation types targeted two categories: idle spaces and functionally integratable spaces. For example, South China Normal University Library repurposed its relocated textbook center into an audio reading room after positive user feedback. Guangzhou University of Chinese Medicine Library transformed an underutilized, functionally single study room into a self-service library .

Implementation processes generally involve project initiation, feasibility studies, expert evaluation, design planning, and construction. Libraries adjust procedures based on circumstances: South China Normal University surveyed readers about audio reading room demand before finalizing plans; Guangzhou University Library solicited reader input on interior design styles after preliminary proposals.

4. Characteristics and Deficiencies of Space Services

4.1 Service Characteristics

First, **philosophical transformation**: Space services have shifted from "collection-centered" to "human-centered" approaches. Recent developments prioritize user needs, experiences, and habits to maximize convenience.

Second, **diverse space types**: All ten libraries offer varied spaces including individual study rooms, group study rooms, meeting rooms, study halls, lecture halls, exhibition halls, coffee bars, and music appreciation rooms. Medical and arts institutions additionally provide discipline-specific spaces like specimen exhibition areas, Lingnan music exhibition halls, MIDI studios, and handicraft zones, demonstrating integration of cultural environments with disciplinary characteristics.

Third, **distinctive layout patterns**: Layouts feature three main approaches: (1) **"Quiet vs. active zoning"** that isolates noisy discussion and exhibition areas from quiet study spaces; (2) **Convenience-based arrangement** concentrating frequently used services like reference, circulation, and self-service facilities on ground floors; and (3) **User flow-based arrangement** positioning high-demand resources along main circulation routes to centralize facilities and staff for efficient management [16].

4.2 Service Deficiencies

First, **low facility construction levels**: Technical and budgetary constraints limit the variety and quantity of self-service facilities. While some libraries have self-service borrowing machines or e-book borrowing terminals, weaknesses remain in printing services, lockers, space reservation systems, and seat management systems.

Second, **low service levels in research-oriented learning spaces**: Although six libraries provide research spaces, limited room numbers and time restrictions fail to meet long-term user needs.

Third, **lack of evaluation mechanisms**: Most libraries lack regular space evaluation systems to investigate usage. While some conduct pre-renovation user surveys, they rarely collect post-renovation feedback on new space experiences, missing opportunities for service enhancement.

5. University Library Space Service Framework

Based on the investigation, this study proposes a comprehensive framework for university library space services and analyzes its components.

5.1 Overall Framework

As shown in [Figure 3: see original paper], the overall framework comprises four modules: space resources, facility resources, human resources, and service evaluation. Space, facility, and human resources form the foundation, integrating into an organic whole that supports user services. Service evaluation identifies deficiencies and provides evidence for space renovation. Evaluation results inform service improvements and space modifications, creating a cyclical process that continuously enhances service quality.

5.2 Component Frameworks

5.2.1 Space Resources Framework

Spaces serve as carriers for service programs. The framework categorizes library spaces into service halls, learning spaces, shared spaces, maker spaces, leisure spaces, and exhibition spaces [Figure 4: see original paper]. Though functions and positioning vary, all aim to meet user needs for learning, communication, innovation, and leisure, achieving human-centered knowledge dissemination and creativity stimulation.

5.2.2 Facility Resources Framework

Facilities divide into hardware and software [Figure 5: see original paper]. Hardware includes artistic decorations, designer furniture, and greenery that create comfortable cultural atmospheres. Software relies on internet technology to provide virtual environments for learning, communication, and sharing. Hardware-software integration enhances space convenience and usability.

5.2.3 Human Resources Framework

Professional teams ensure service delivery [Figure 6: see original paper]. Management formulates strategies and organizes routine operations. Staff have clear divisions of labor: space attendants manage daily operations and equipment guidance; student volunteers assist with simple tasks; reading promotion and reader service departments organize activities; subject librarians provide reference and disciplinary services; and technical staff maintain facilities.

5.2.4 Service Evaluation Framework

Evaluation identifies service gaps and improvement directions [Figure 7: see original paper]. Libraries must compile user feedback and evaluation results into improvement plans. The process involves: (1) establishing evaluation objectives aligned with library development plans; (2) developing indicator systems such as outcome evaluation (analyzing behavioral, cognitive, skill, and attitudinal changes) and performance evaluation (examining service quality, effectiveness, and resource efficiency) [18]; and (3) employing multiple methods including observation, questionnaires, interviews, and management information systems. Results should inform scientific analysis of space utilization, user preferences, equipment usage, and satisfaction, enabling flexible layout adjustments and continuous improvement through an “evaluate-improve-revaluate” cycle.

6. University Library Space Service Strategies

Service constitutes the eternal theme of academic libraries, with space services representing a key focus. Based on the investigation, four strategic recommendations emerge:

6.1 Formulate Scientific Space Service Development Plans

Space service transformation requires integrating resources, services, and spaces to create diversified venues that facilitate teamwork, knowledge sharing, and inspiration [19]. This lengthy process necessitates scientific planning to guide implementation. Libraries should: (1) define vision based on strengths and characteristics to reflect core competitiveness; (2) analyze future trends and establish long-, medium-, and short-term goals incorporating space renovation, evaluation, facilities, collections, services, budgets, and staffing; and (3) continuously adjust plans based on current conditions, domestic/international trends, and implementation challenges, reflecting on unmet goals to inform future management [20].

6.2 Establish Diversified Service Spaces Based on User Needs

Given limited physical space, establishing diversified services requires optimizing collection areas. Libraries should develop scientific acquisition plans with appropriate copy numbers and relocate low-use materials to compact storage based on circulation data, thereby compressing collection space without affecting print resource access.

Diversified spaces must meet varied needs for reading, learning, communication, sharing, and leisure while adapting to developmental trends by creating maker spaces for innovation and entrepreneurship. Libraries should also exploit disciplinary and local cultural characteristics to build distinctive service spaces. Furthermore, services can extend beyond library buildings into campus spaces—following Professor Jin Wugang's suggestion at the 2017 "New Trends in University Libraries: Environment, Space, Resources, Services" forum, libraries could establish branch services in teaching buildings, cafeterias, and dormitories, integrating library space services into students' daily learning and living environments [21].

6.3 Promote Space Services Supported by Information Technology

Scientific management and efficient utilization require technological support, while advanced technologies demonstrate value through library services [22]. The two aspects are mutually reinforcing.

First, libraries should strengthen infrastructure to meet basic needs, particularly equipping individual and group study rooms, meeting rooms, and rest areas with computers, interactive whiteboards, projectors, office software, and discipline-

specific tools like music production, statistical analysis, computer modeling, and industrial design software.

Second, libraries should gradually introduce intelligent information systems and self-service equipment for more efficient management. Intelligent systems include space reservation, seat management, RFID, video conferencing, and lighting control systems. Self-service equipment encompasses borrowing/returning machines, e-book borrowing terminals, portable readers, 24-hour return machines, vending machines, lockers, and network printers. User manuals and training should facilitate equipment usage.

Additionally, libraries must conceptually keep pace with emerging technologies. Recent innovations like IoT, 3D printing, AI, AR, and VR have gained popularity. Shanghai University Library employs Kinect 3D cameras and gaming systems for entertainment [23], while Miami University Library's ShelvAR app uses AR technology to assist staff in accurate shelving [24]. Libraries should develop phased plans to progressively introduce such technologies after considering budget, staffing, and service benefits.

6.4 Develop Space Service Evaluation Systems

As a user-centered service model, space service quality requires user supervision and evaluation. Systematic evaluation helps libraries comprehensively understand space operations and user experiences, identify service deficiencies, and provide feedback.

Evaluation indicator systems should stem from strategic objectives, covering dimensions such as space usage needs, behaviors, facility quality, and service effectiveness [25]. "Space usage needs" investigate user purposes and desired service atmospheres. "Space usage behaviors" examine usage duration, frequency, and activities like information retrieval, writing, discussion, and entertainment. "Facility quality" assesses hardware/software types, quantities, convenience, and satisfaction. "Service effectiveness" measures impacts on learning, knowledge, skills, and behaviors [26].

Evaluation methods include observation, questionnaires, interviews, and management information systems. Libraries can also adopt approaches from other fields, such as importing space visitation data into GIS systems to create heat maps visualizing user movement patterns and area popularity [27].

Results application requires scientific analysis of utilization rates, disciplinary preferences, equipment usage, and satisfaction. Libraries should flexibly adjust layouts to maximize support for learning, research, and leisure, continuously refining the "evaluate-improve-revaluate" cycle to deliver high-quality space services.

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Author Contributions:
Huang Yaodong: Conducted data investigation and drafted the manuscript;
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Wu Yuwei: Conducted data investigation and guided writing.

Space Service in Academic Library: A Study of Academic Libraries in Guangzhou Higher Education Mega Center

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Abstract: [**Purpose/significance**] By analyzing the situation, characteristics and deficiencies of academic library space service in Guangzhou Higher Education Mega Center, this paper summed up strategies for space service. [**Method/process**] This paper conducted deep and meticulous analysis in terms of space types, facilities, appointment and transformation through field studies and questionnaire survey. And this paper summarized the space service framework from four dimensions: space resource, infrastructure resource, human resource and service evaluation. [**Result/conclusion**] Academic libraries can promote space service by making scientific development plan, building diversified space, using information technology and developing evaluation system.

Keywords: space service; space type; service framework; academic library; Guangzhou Higher Education Mega Center

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