Development of a Standardized Digital Resource Management System for Flat Services: A Case Study of Chongqing University Library (Post-print)

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Abstract

[Purpose/Significance] To address digital resource management issues in flattened services, a standardized digital resource management system is established to improve the quality of digital resource management and the efficiency of flattened services. [Method/Process] Through measures such as screening of digital resource management parameters, formulation of standardized codes, formatted input of navigation information, standardized operations for maintenance processing, and formatted output of analysis and utilization reports, standardized management of digital resources is implemented. [Results/Conclusion] Through the establishment of a standardized digital resource management system, digital resources owned by libraries can be inventoried, the efficiency and organization of digital resource management are optimized, and the quality of precision digital resource services is improved.

Full Text

Preamble

Construction of a Standardized Management System for Digital Resources in Flat Service-Oriented Libraries: A Case Study of Chongqing University Library

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Introduction

Flat service in libraries originates from the broader trend of flattening in enterprise management and product design. Apple's application of flat design principles to mobile phones—using fewer buttons to create a clean, intuitive interface that directly presents applications—has made their devices exceptionally user-friendly. Similarly, Jack Welch, renowned as the "world's number one CEO," implemented flattening reforms at General Electric in 1981, substantially increasing GE's profits and expanding its scale. These successful cases provide valuable lessons for libraries. Scholars both domestically and internationally have conducted research on flat library services by compressing and streamlining the intermediate steps users must navigate to access knowledge, reducing delays in resource organization and decision-making, and accelerating the responsiveness of library information services. Building on earlier research, Chongqing University Library has undertaken the construction of a standardized management system for digital resources within the context of digital resource development. This initiative not only enhances management and discovery capabilities but also directly impacts the efficiency with which users access knowledge, representing a critical component in advancing flat service delivery.

Standardized management refers to the development of rules for actual or potential problems to achieve optimal order within an organization's production, operations, and management scope. In contemporary practice, it generally denotes the enterprise standardization management system. In recent years, rapid information technology development has prompted libraries to invest heavily in digital resources, acquiring numerous databases and developing specialized collections, resulting in increasingly abundant digital holdings. To deepen flat service implementation, Chongqing University Library has drawn upon enterprise standardization management practices to establish unified naming conventions and coding systems for digital resources, enabling centralized discovery and management. This approach enhances database construction and service delivery by compressing intermediate service links through flat service model transformation, helping users overcome technical and institutional barriers in service acquisition. Through flat service process reengineering, libraries can streamline services to better serve readers, while B2C resource development models with flattened structures address gaps between resource demand and access in flat services, helping users eliminate resource obstacles and improve library resource utilization efficiency. As flat services advance further, we argue that constructing a standardized management system for digital resources is essential.

Problems in Library Digital Resource Management

2.1 Inconsistent Classification Standards and Vague Categorization

Current digital resource classification primarily employs three approaches: by language (Chinese, English, Japanese, Russian, German, etc.), by acquisition method (trial, purchased, free resources), and by resource type. While the first

two standards are relatively clear, classification by content type offers the greatest convenience for users seeking specific resources. However, this approach lacks uniform standards across libraries. For instance, Peking University categorizes digital resources into 11 types including e-books, archival materials, statistical/research data, video/audio, and ancient documents; Tsinghua University uses 29 categories such as journals, newspapers, images, technical standards, search engines, books, and bibliographies; Wuhan University Library employs 22 categories including encyclopedias, newspapers, biographies, dictionaries, multimedia, and legal databases; and Sun Yat-sen University Library divides resources into 15 types including e-journals, newspapers, yearbooks, reference tools, multimedia resources, and evidence-based medical databases. These classification systems evolved from S.D. Lee's 2002 *Electronic Collection Development: A Practical Guide* and the ISO 2789 international library statistics standard, reflecting each library's unique resource characteristics and management philosophies. While need-based classification demonstrates scientific and practical value, accommodating increasingly diverse digital content and discovery formats, the lack of completely uniform standards across the library community presents challenges.

Digital resource types and categorization methods require stable, long-term implementation based on each library's selected standards. Consistency is essential for sustained digital resource work and respects established user habits. Under current conditions where complete standardization remains elusive, libraries must determine their own classification types and standards. However, a survey of 39 "985 Project" university libraries reveals serious issues: inconsistent classification standards, with types and quantities varying annually; overlapping categories, such as listing both "multimedia resources" and "video resources"; and incorrect or incomplete categorization, where resources belonging to multiple types are assigned to only one. Overall, digital resource classification remains chaotic and ambiguous.

2.2 Weak Management Awareness of Sub-Databases

Sub-databases (or sub-platforms) are management units that have emerged through long-term digital resource product development and marketing, generally referring to subdivisions within a larger database platform without explicit standardization. For example, the CNKI platform contains numerous sub-databases: China Academic Journals Network Publishing Database, China Doctoral Dissertations Full-Text Database, China Excellent Master's Theses Full-Text Database, China Important Conference Proceedings Full-Text Database, International Conference Proceedings Full-Text Database, China Important Newspapers Full-Text Database, China Yearbooks Network Publishing Database, China Reference Works Online Publishing Database, and China Patents Full-Text Database. Database developers continuously create new sub-databases and phase out old ones based on user needs and market prospects. Libraries typically purchase selected sub-databases rather than entire platforms

based on institutional requirements. Therefore, sub-database-level management is essential.

Currently, library awareness of sub-database management remains weak. Some libraries are unclear about their sub-database holdings and have ambiguous understanding of sub-database content and platform relationships. A survey of 39 "985 Project" university libraries found that 13.15% failed to recognize sub-database importance, while 34.23% recognized it but lacked dedicated sub-database management.

2.3 Low Database Maintenance Efficiency

Digital resource maintenance, including information updates and troubleshooting, constitutes critical management work. Library maintenance is closely linked to vendor maintenance, requiring feedback loops between vendors and library staff who serve as both technical consultants and intermediaries. However, lacking unified maintenance requirements and standards, this work is highly subjective and dependent on individual technician and librarian awareness, resulting in serious delays in updates and issue resolution, yielding low overall maintenance efficiency.

Chongqing University Library's Digital Resource Management Standards

3.1 Parameter Selection and Coding Development

Aiming to reduce intermediate steps between users and resources, we surveyed database parameter importance. Users identified language, content type, and discipline as most critical for resource access, while librarians prioritized platform, sub-database, and acquisition method. Consequently, we established six management parameters: language, platform, sub-database, content type, discipline, and acquisition method. This filtering eliminated less impactful parameters, clarifying management objectives.

Based on actual needs and projected growth, we adopted a three-digit serial number for platforms and two digits for sub-databases. Languages were categorized as Chinese, English, and other (Russian, Japanese, etc.). Content types were divided into 16 categories: journals, books, newspapers, dissertations, conference papers, numeric data, reference tools, patents, standards, abstracts and indexes, full-text (integrated), electronic images, electronic audio, video, examination systems, and analysis tools. Disciplines were organized into 13 categories: philosophy, economics, law, education, literature, history, science, engineering, agriculture, medicine, military science, management, and interdisciplinary. Acquisition methods were classified as purchased outright or not purchased.

We developed a unified coding system using main and auxiliary codes. The main code (numeric) reveals language, platform, and sub-database information, while the auxiliary code (alphabetic) indicates content type, discipline, and acquisition

method. All codes are prefixed with "CQU" for Chongqing University. The coding principles are shown in Table 1 .

For example, the Wanfang Patent Database is coded as CQU102202(imA): CQU represents Chongqing University; 102202 is the main code where 1 indicates Chinese language, 022 represents platform serial number (Wanfang Knowledge Platform), and 02 is the sub-database serial number; (imA) is the auxiliary code where i=standards type, m=interdisciplinary, and A=purchased outright.

3.2 Standardized Navigation Information Management

Digital resource navigation systems use modern tools to centrally organize, classify, evaluate, and arrange digital resources by platform or sub-database, establishing categorized directory resource organization systems with dynamic links and subject databases published on library homepages to guide users. User satisfaction surveys indicate that navigation content significantly impacts satisfaction. Standardized navigation helps users accurately locate information efficiently, reducing intermediate steps.

We established navigation categories based on three user-focused parameters: language, type, and discipline, displaying content in two levels: platform information (first level) and sub-database information (second level). Resources are described using standard templates with content and length restrictions. Descriptions should concisely reveal purpose, authority, capacity, and features within 60 characters. For example, CNKI China Excellent Master's Theses Full-Text Database is described as: "A commonly used domestic master's thesis full-text database covering all disciplines since 1999, with daily updates and CNKI cross-database search support."

3.3 Standardized Maintenance Operations

Maintenance efficiency directly impacts flat service delivery. We developed the *Chongqing University Library Digital Resource Maintenance Standards* to formalize maintenance involving both librarians and vendors. Vendors access our maintenance platform to submit updates and issue reports, which librarians verify and confirm within 8 hours. For remote resources, vendors must promptly report updates and failures; librarians verify and publish within 8 hours. For user-reported issues, librarians verify and submit to vendors within 8 hours, with vendors responding and resolving within 8 hours. For mirror resources, librarians must handle updates and troubleshooting within 8 hours. This platform reduces intermediaries, makes services "visible," and minimizes subjective factors affecting maintenance quality.

3.4 Standardized Usage Analysis Reports

As digital resource investment grows, performance evaluation becomes increasingly important. Usage analysis reports reflect acquisition quality and user needs. We identified three key parameters that best demonstrate user behavior:

search sessions, browse/streaming counts, and download counts. Analysis is conducted across our 16 content types using uniform templates. Librarians simply import usage data, and the system automatically generates comparative analysis reports. We publish quarterly reports aligned with institutional assessment requirements.

Effects of the Flat Service-Oriented Digital Resource Standardization Management System

The standardization system reduces service and acquisition costs, compresses intermediate consumption, and accelerates flat service implementation through three primary effects.

4.1 Complete Inventory of Digital Resources

Systematic platform and sub-database coding enables comprehensive inventory of all purchased resources. We precisely track quantities, content, and relationships, resolving discrepancies between cataloged and actual holdings and addressing information gaps from sub-database splits and mergers. As shown in Table 3 , from April 2001 (first acquisition) to December 2018, we purchased 163 platforms containing 231 sub-databases (132 Chinese, 98 English, and 1 other language).

4.2 Optimized Management Efficiency and Order

Standardized navigation templates improved efficiency by 37.5%: librarian editing time decreased from 3 to 2 minutes per database, while user reading time dropped from 1 to 0.5 minutes. Unified resource organization and description ensure consistency from vendor-provided information through librarian maintenance to user access, coordinating stakeholders and avoiding redundant development, resource waste, and information redundancy.

4.3 Enhanced Precision Service Levels

Standardized coding facilitates seamless data exchange between resources. For example, the sub-database code's first auxiliary letter 'd' clearly identifies dissertation resources, improving recognition and enabling comprehensive, accurate resource discovery through smart library systems. Standardized usage reports unify comparison types and metrics, yielding more scientific user statistics and service plans that better reflect actual needs.

Lessons from Standardization Management System Construction

5.1 Need-Based Implementation

Standardization must align with each library's specific management and service context. While experiences can be shared, "adapting for institutional use" is the ultimate goal. Chongqing University's strengths in architecture, management, mechanical engineering, electrical engineering, environmental science, metallurgy, and information science warrant substantial digital resource investment, necessitating forward-looking considerations for sub-database coding capacity and resource type classification. Libraries should implement standardization according to their unique digital resource volumes, classification standards, and management workflows.

5.2 System Optimization Requirements

Standardization requires robust library management system support, affecting content management, data exchange, and workflow processes. Platform design must align with standardization requirements. Chongqing University developed a new-generation ERMS system supporting standardized management across acquisition, management, discovery, maintenance, and statistics, ensuring smooth implementation.

5.3 Phased Implementation Approach

Standardization is a progressive, continuously improving systematic endeavor requiring stepwise implementation. Goals and priorities should focus on improving management, organization, and service efficiency. We prioritized purchased resources for initial standardization, coding, and management. Trial and free resources, with their different ownership, usage terms, and uncertain durations, will be addressed subsequently. This gradual approach ensures flat, smooth, concise, and efficient digital resource management and service delivery.

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Author Contributions:
Wang Ying: Designed the research framework and wrote the paper;
Yang Xinya: Revised portions of the paper.

Note: Figure translations are in progress. See original paper for figures.