A Systematic Review and Analysis of Public Library Operational Data Systems: Postprint

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Abstract

[Purpose/Significance] Due to variations in the content and modalities of business services across libraries, coupled with inconsistent levels of digitization and standards in operational processes, data resource integration faces significant challenges, impeding related work. This study systematically organizes and analyzes the business data architecture of public libraries, aiming to foster the gradual establishment of data standards for public library operations and to expand big data applications in the public library domain. [Method/Process] Employing grounded theory methodology, in-depth interviews were conducted with 15 department heads from various divisions within public libraries. Through open coding, axial coding, and selective coding, concepts and categories pertaining to public library business data were extracted. [Results/Conclusion] A public library business data architecture was constructed, centered on three core operational domains: user services, resource development, and operational maintenance, encompassing 20 main categories and 62 related concepts. This architecture reveals the comprehensive framework of public library business data, provides directional guidance for business understanding in big data analytics, and establishes a foundation for the digitization of public library operations and big data integration. The authors also present illustrative examples of big data analytics applications, including literature resource analysis, user profiling, and operational business analysis, based on this architecture.

Full Text

Abstract

[Purpose/Significance] Due to variations in the content and delivery of services across libraries, coupled with inconsistent degrees of digitization and standards in business processes, integrating data resources has become challenging, hindering related work. This paper systematically analyzes the business data system of public libraries, aiming to promote the gradual formation of data

standards for public library operations and expand the application of big data in public libraries.

[**Method/Process**] Using grounded theory, we conducted in-depth interviews with 15 department heads from public libraries. Through open coding, axial coding, and selective coding, we extracted concepts and categories related to public library business data.

[**Result/Conclusion**] We constructed a public library business data system centered on three core components: user service business, resource construction business, and operation and maintenance business, encompassing 20 main categories and 62 related concepts. This system reveals the overall framework of public library business data, provides guidance for business understanding in big data analysis, and offers a foundation for the digitization and big data integration of public library operations. Based on this system, we also provide examples of big data analysis applications in literature resource analysis, user profiling, and operational business analysis.

Keywords: grounded theory; public library; public library business data system; big data analytics application
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1. Introduction

In June 2011, following the release of the McKinsey Global Institute's report "Big Data: The Next Frontier for Innovation, Competition, and Productivity" [1], "big data" has become a key research term across various fields. Gartner defines "big data" as information assets characterized by high volume, high velocity, and high variety that require new processing modes to enable enhanced decision-making, insight discovery, and process optimization [2]. Big data and its associated concepts, theories, methods, technologies, tools, applications, and practices are collectively referred to as data science. The data science processing flow consists of datafication, data processing, data analysis, data presentation and application, and data product delivery [3]. Datafication involves collecting data recorded manually or by systems from real-world business activities, while data processing entails purposeful preprocessing, transformation, analysis, modeling, and application based on business and data understanding. Big data profoundly impacts existing knowledge systems, lifestyles, financial services, and public management [4].

Public libraries face unique challenges in big data applications beyond the common technical hurdles experienced across domains, as they must also contend with distinct patterns within the library and information science field [5]. In today's society, public libraries serve as information discoverers, organizers, and developers. Establishing distinctive service strategies, identifying service di-

rections, and building service platforms represent important tasks for public libraries [6]. Additionally, beyond universal services, public libraries should provide targeted services to meet individual reader needs, thereby enhancing service effectiveness and better satisfying public cultural demands [7]. The big data era presents both opportunities and challenges for public library development. Opportunities include establishing and improving new knowledge services and providing strong technical support for expanding public cultural services [8]. Currently, public library data primarily originates from business data, resource data, and network data. Business data refers to documentation from business processes, including progress, status, workflow records, and outcomes, encompassing resource-user interaction data. Analyzing these data enables librarians to accurately monitor current conditions, identify business problems, establish new service models, and execute effective decisions. However, as data objects become increasingly large and complex, with deeper mining requirements and higher standards, traditional library information services face severe challenges [9].

At present, public libraries across China differ in collection content and services provided. Sharing and integrating regional public library resources will be the direction for improving public cultural service levels and development. To achieve fair, reciprocal, and shared goals, it is necessary to connect data from various public libraries and conduct timely monitoring and analysis. Service model innovation in the big data era holds significant theoretical and practical importance for the long-term healthy development of public libraries [10]. However, current big data applications in public libraries mainly focus on resource acquisition and reader demand analysis [11], which somewhat limits the scope for business improvement and service innovation. Moreover, information systems and business services vary across public libraries, resulting in inconsistent digitization degrees and standards for business data. This makes data resource integration extremely difficult and constrains the sustainable development of big data applications in public libraries [12].

Based on our field interviews, the main reasons for data inconsistencies across public libraries are: (1) organizational management and business processes are not completely uniform; (2) data recording methods, cycles, types, and formats differ; (3) statistical analysis methods and purposes vary; and (4) information system designs and architectures are not entirely consistent. From a big data analysis perspective, public library data originates not only from business processes in integrated management systems but also from various network platforms (websites, self-media, social media) and user service-related data (access logs, search logs, evaluation data), all of which hold tremendous potential value [13].

Public library big data research can be divided into three categories based on different entry points: The first category discusses the necessity of public library service innovation in the big data era, generally without addressing specific big data technologies. The second proposes several services that big data

can improve in public libraries and how to improve them, focusing on service enhancement rather than specific big data analysis steps. The third proposes specific services and improvement methods, emphasizing concrete big data analysis procedures, typically presenting algorithms and conducting experiments. Comparative analysis of domestic and international public library big data research reveals that Chinese literature primarily adopts a library and information science perspective, starting from public library business and focusing on the second category, with a small portion belonging to the first category. English literature mainly adopts a computer science perspective, starting from big data technology and focusing on the third category, with a small portion belonging to the second category. This indicates that current research approaches public library big data from specific points, discussing only partial aspects, with results from different entry points often non-overlapping or even unrelated, lacking overall logical coherence.

To promote public library service optimization and big data application development, it is necessary to form a relatively comprehensive and complete system based on resource and user-related data generated during public library business service processes, providing an important foundation for data collection standards and public cultural service big data application research. Currently, different public libraries have varying business operations, and different types of data have inconsistent meanings behind them, making business data unification difficult. Therefore, taking typical medium-sized public library operations as examples, we conducted field interviews with relevant department personnel to 梳理 actual business relationships and data. From a big data analysis perspective, we explored and summarized public library business content and scope, used grounded theory to explore and induce the public library business data system, reconstructed the business relationship architecture, and verified its universality using a small public library as a test case. The purpose of this study is to distinguish the core categories of public library business data and their main concepts and connotations, hoping to provide theoretical guidance and practical significance for public cultural service big data research, ultimately integrating commonly shared businesses across public libraries as objects for data integration through networking, and using this big data analysis to provide better services and decision-making.

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2. Research Methods and Data Analysis

2.1 Grounded Theory

Public library department structures are not entirely based on business types. Different departments may generate structurally identical business data. For example, circulation departments, children's circulation departments, and periodical departments all provide reading and lending services, generating circulation data that differ only in target audiences and document types. Therefore,

business data cannot be explored directly through department structures; instead, business content must be analyzed in depth to construct a public library business data system from the bottom up. Grounded theory is a qualitative research method [14] that emphasizes building new theory from collected data, thereby discovering hidden structures in the target research field and better conceptualizing research problems [15]. We used grounded theory to analyze interview records through three levels of coding: open coding, axial coding, and selective coding, followed by theoretical saturation verification. Original data consisted of interview records obtained from the Capital Library, with interview records from the Jinling Library used for theoretical saturation verification to complete the construction of the public library business data system.

2.2 Semi-Structured Interviews

To construct a public library business data system from a big data analysis perspective, we conducted semi-structured interviews with 15 relevant department heads from the Capital Library and Jinling Library (each lasting at least 120 minutes). Interview content covered: business scope, processes, service content, business systems, and data needs of business departments (interview outline shown in Table 1); and department functions, data transmission, data monitoring and analysis, and online services of technical departments (interview outline shown in Table 2). The interview objectives were to 梳理 existing business processes and service content, collect existing resource and business-related data, and construct a public library business architecture. We transcribed the interview recordings from both libraries into text format, obtaining two sets of business department interview records from different public libraries. The Capital Library records were used for grounded theory coding and system construction, while the Jinling Library records were used for theoretical saturation verification.

2.3 Open Coding

Open coding involves conceptualizing and categorizing codable text from interview records and recombining them. To construct the public library business architecture, we coded business content mentioned in each department's interview records, assigning concepts to each business element, effectively beginning with conceptualization. Concepts primarily originated from interview content, with one department potentially involving multiple business concepts. After conceptualization, business content from each department's interview records had corresponding basic concepts, yielding 421 conceptualization results. Table 3 lists 124 of these initial conceptualizations. Due to the complexity of original materials, we further categorized these concepts based on relevance and relationships, abstracting and integrating them to obtain 62 preliminary categories. Open coding results are shown in Table 3.

2.4 Axial Coding

Relationships among categories obtained through open coding remain unclear. The main task of axial coding is to identify correspondences among categories formed during open coding and abstract them into main categories. Through analysis and comparison of the 62 initial business categories, we conducted axial coding to derive 20 main business categories, each corresponding to multiple initial categories, as shown in Table 4 .

2.5 Selective Coding

The main categories obtained through axial coding have interrelated and interactive relationships. Through selective coding, we can identify core categories that 梳理 the core factors of public library business and discover relationships among businesses. This coding process requires core categories to reach saturation. Through inductive analysis, these 20 main business categories were further abstracted into three core categories: user service business, operation and maintenance business, and resource construction business (see Table 5). User service business primarily involves direct or indirect user interaction generating data. Users include not only traditional readers but also mobile users, librarians, governments, enterprises, and other institutions—any entity with service needs constitutes a public library user. Resource construction business involves building various resources in public libraries, including document information resources, digital information resources, characteristic resources, space resources, human resources, and software/hardware resources. Operation and maintenance business provides management support for user services and resource construction work, generating various management activity data. The three core businesses interact through user types, service content, usage methods, management models, and resource types to form business scenario reconstruction data and work records, thereby demonstrating the value and application direction of public library big data.

2.6 Theoretical Saturation Test

After completing theory construction through three-level coding, theoretical saturation must be tested. If saturation is not achieved, additional data must be collected to discover new concepts and categories [16]. After testing the theory using Jinling Library interview records, no new concepts or categories emerged, indicating that the constructed theory has reached saturation and the analysis process is credible.

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3. Business Data System Construction and Analysis

Through grounded theory research, we constructed a public library business data system from a big data analysis perspective, as shown in Figure 1 [Figure

1: see original paper]. The system divides public library data into three core business data types: user service, resource construction, and operation and maintenance, with relationships consistent with actual business logic and functions. Public libraries exist for users, with missions to support users and innovate services, analyzing each user's actual needs and establishing corresponding service strategies [17]. To meet these specific user services, public libraries construct relevant resources, with both services and resources supported by operation and maintenance business management. In other words, user services use resources according to operation and maintenance management rules, generating resource interaction data during service participation. These interaction data feedback to operation and maintenance businesses to adjust management models or resource construction. Resource construction businesses support operation and maintenance work in addition to providing resources and services, and internal resource relationships can generate knowledge structure-related data and special attribute tag data used by users and managers. Operation and maintenance businesses optimize user services and resource utilization, recording interaction processes between users and library resources. Analyzing these data reveals resource utilization scenarios, user behavior preferences, and, when combined with resource content information, exposes spatiotemporal interaction relationships among "user-service-carrier-content," making user demands for information content fully apparent.

3.1 User Service Business and Its Data

User service business primarily includes six main categories: reference consultation, resource circulation, promotion, event organization, basic assistance, and special services. As shown in Figure 1 [Figure 1: see original paper], these services can operate independently or in combination, with all requiring data storage. Combining these data can reveal various user needs, behaviors, and preferences. For example, as information technology continuously evolves, new retrieval methods (such as voice and visual search) are becoming familiar to the public. Managers wishing to enhance service levels can analyze user service business data based on user types and preferences to evaluate the necessity of introducing such technologies, reducing unnecessary construction costs.

Reference consultation and resource circulation business data include not only general user inquiries but also service data provided to management institutions or other organizations, offering rich analytical value that demonstrates public library capabilities and can become a characteristic service. Promotion, event organization, and basic assistance represent similar business data across most public libraries, but inconsistent recording methods and varying digitization degrees make data integration and application challenging. Traditional public library service models are document resource-centered, with "book-based" and "journal-based" concepts guiding business classification by document type and operation content. However, this model overlooks user needs, resulting in unclear division of user service businesses and functional segmentation, reducing

service efficiency. Sometimes, information services needed by readers are split across different departments (reading rooms, reference departments, information management departments), preventing readers from satisfying their information needs through a single department. To achieve personalized and specialized services, public libraries must utilize current reference consultation services (Table 5, 010101), decision consultation (Table 5, 010102), and network services (Table 5, 010203), combined with basic user attributes from personal processing (Table 5, 010501), to reorganize different service data and mine user habits and characteristics across public libraries. To better develop user service businesses, public libraries must understand user information needs, including problem content, lacking information topics, document types, and service forms, strengthening digital resource promotion (Table 5, 010301) and conducting targeted activities (Table 5, 0104) such as lectures, competitions, and conferences. Through combining and mining these data, information resources can be processed (Table 5, 020202) to form new information resources, and based on analysis results, user-centered redesign of business processes and service content details can better satisfy user needs and achieve personalized services.

3.2 Resource Construction Business and Its Data

Beyond document and digital information resources, resource construction business includes hardware facilities, space, software, human resources, and characteristic resource construction. As shown in Figure 1 [Figure 1: see original paper], logical relationships among public library resource construction businesses extend from space and human resources to hardware and software infrastructure, primarily supporting document, digital, and characteristic resource construction. Space resources are the most easily overlooked basic resources, with monitoring data providing references for maximizing space utilization. Combining space information, service content, and user data can optimize user services and improve space utilization rates.

Public library work has professional and service characteristics distinct from other institutions. Human resource construction data can serve as job matching and recruitment basis, and when combined with operation and maintenance business data, can better achieve public cultural service goals. Hardware and software resources serve as infrastructure for information resource collection, preservation, processing, and presentation, and are primary channels for users to directly or indirectly access library information services. Therefore, these business data help managers understand equipment usage, damage, maintenance, and operation conditions, aiding library management and development. Based on usage and needs, libraries can propose self-developed software/hardware or specification development models, forming special standards within the public library industry. These unique efforts naturally become characteristic resources, which can include books (such as ancient texts), hardware (such as microfilm readers), media (such as children's enlightenment videos, special columns, 3D animations), research (such as digital humanities, book restoration technology,

innovative culture, think tanks), and systems (such as co-construction and sharing platforms). Characteristic resource construction itself carries unique data information, and analyzing these data can reveal new developments and trends in the public library industry while enhancing service innovation and interest.

With developing information technology, public libraries should not only address explicit personalized needs but also continuously explore implicit and potential personalized information needs [18]. Libraries must first improve acquisition/interviewing businesses (Table 5, 020101, 020201) by analyzing and understanding user information resource needs for targeted collection. In processing (Table 5, 020103, 020202), various information resources require deeper revelation and organization, providing not only descriptive features (carrier form, title, author, publisher) but also content or semantic-level granularity for more precise knowledge units, creating new media resources (Table 5, 020104, 020203) that can even become new characteristic resources (Table 5, 0207). Some public libraries enhance knowledge services by revealing and reorganizing literature content through subject analysis. To achieve this, librarians need to master specialized subject knowledge and be freed from tedious document services to participate in content revelation and problem-solving [19]. By understanding data relationships and business relationships through this business data system, big data analysis and text mining technologies can reorganize and disseminate information resources according to specific needs, saving librarians' time and effort.

3.3 Operation and Maintenance Business and Its Data

Operation and maintenance business can be divided into two subcategories based on data application types: administrative management work (basic management, personnel management, financial management) and business management work (data management, hardware facilities management, information resource management, software platform management). Administrative data are mostly routine with unclear analysis targets, but can be combined with other data after processing. Business management data record interaction processes between user services and library resources. Analyzing these data reveals resource utilization scenarios and user behavior preferences. When combined with resource content information, they yield spatiotemporal interaction relationships among "user-service-carrier-content," fully exposing user demands for information content.

Currently, operation and maintenance businesses are split across different departments and recorded in different systems alongside corresponding resource construction and user service businesses. Since operation and maintenance processes vary across libraries, data recording formats, types, and frequencies differ, making standardization and rule-based integration the real challenge for big data integration.

Our interviews revealed that most innovative efforts in public libraries concen-

trate on operation and maintenance businesses. Websites, public accounts, and other self-media platforms are important promotional channels that strongly support user attraction and library development. Strengthening software platform management (Table 5, 0304) and hardware facilities management (Table 5, 0302), including meeting space facilities, enhanced network access, printer maintenance, interlibrary document delivery platforms, online services, and online payment, improves user experience and service perception. With information technology development, data management businesses (Table 5, 0301) such as statistical analysis, data transmission, data monitoring, and data processing have become the focus of public library big data development. With policy guidance and funding support, collecting massive data monitoring from document resources, digital resources, websites, mobile platforms, cloud platforms, business systems, hardware facilities, and spaces enables timely statistical analysis to identify anomalies, understand real-time status, and predict trends. These data can even be processed and shared with other public libraries for interlibrary cooperation and data integration, forming regional public library big data service applications.

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4. Big Data Analysis Application Examples Based on the Public Library Business Data System

One factor hindering public library big data analysis development is the lack of unified standards for business divisions and data fields, making data integration difficult and preventing business systems from connecting with cloud platforms. Establishing a public library business data system can help standardize operations and provide digitization standards for records still in print form. At the business level, this system helps data analysts identify which businesses to obtain data from, how to obtain it, and how analysis might improve certain businesses when decision-makers plan big data analysis tasks. In other words, when data analysts require data fields a, b, and c from businesses A, B, and C (or descriptive attributes and evaluation indicators of businesses A, B, and C), the analysis may provide improvement assistance to related businesses, making data analysis more purposeful. Analyzing public library business data can optimize business processes and improve work efficiency while providing effective support for development decisions and strategic planning [20]. We provide examples to illustrate the system's application and offer references for public library big data analysis.

4.1 Literature Resource Analysis

Analyzing literature resource distribution and utilization can improve public library literature resource construction businesses, ensuring literature resource services for specific applications such as book acquisition and online resource structure adjustment. By combining collection quantities of various resource

types with user data, we can obtain user preferences and habits and discover how well different thematic resources meet user needs. Collection quantities are derived from analyzing resource types and purchase quantities in acquisition records, providing a basis for improving acquisition businesses (Table 5, 020101) and predicting future usage frequency to enhance service quality. For example, increasing procurement of high-demand, low-stock information resources while appropriately reducing purchases of overstocked resources makes collection structures more rational and fund utilization more efficient. Resource analysis results regarding distribution, usage, status, and traffic can independently improve resource processing. For instance, analyzing digital resource types and stock using entity resource digitization records can improve digitization businesses (Table 5, 020103), considering digitization for insufficiently digital resource types to increase circulation and better meet user needs.

4.2 User Portrait Analysis

User portrait analysis aims to concretize user images, making public library information services more responsive to user needs, achieving personalized services, and serving as a guarantee for improving user service businesses. It can also improve activity content and website structure. User portraits require comprehensive analysis of demographic attributes, borrowing behavior, reading behavior, participation behavior, and resource usage behavior. The portrait is an umbrella term for analysis results, with various single analysis tasks having good applications. For example, deeply mining all user activity participation data requires attendance records from event organization businesses, information acquisition channels, user personal attributes, and participation depth. This reveals which activity types have stronger user appeal, providing more decisive and effective organizational basis for improving event organization (Table 5, 0104), promotion, and attendance prediction, enabling libraries to hold more user-appealing, popular, and well-attended activities. User analysis combined with resource or business analysis can improve related businesses. For instance, combining digital resources and network services with user data and analyzing user click, browse, and search logs on library websites reveals user preferences for website resources, helping librarians improve website maintenance (Table 5, 030401) and release more targeted resource information. This analysis can also be extended to other promotional platforms like WeChat public accounts and Toutiao self-media platforms (Table 5, 030404).

4.3 Operation Business Analysis

Operation business analysis enables effective supervision of public library business execution and serves as an important basis for operation and maintenance businesses. For example, a key operational analysis project requires using usage and anomaly records from software and hardware maintenance to improve these maintenance businesses (Table 5, 0302, 0304). Specifically, analysis can promptly reveal software/hardware usage status and anomalies for timely prob-

lem resolution. Long-term analysis can also identify frequently used and frequently damaged equipment. High-frequency, high-anomaly equipment may indicate excessive demand beyond capacity, leading libraries to consider adding such equipment to improve procurement targeting (Table 5, 030301, 030501). Business analysis combined with other object analysis can also assist in improving other business areas. For example, extracting public opinion evaluation data related to library activities from external public opinion information and combining it with user portraits reveals user emotional attitudes and tendencies toward library events, improving activity promotion (Table 5, 010303) and organization (Table 5, 0104), enabling more targeted and focused event development and promotion to attract user participation.

5. Conclusion

This study integrates grounded theory throughout the research process. Through interviews with public library department heads, we abstracted 20 main categories: reference consultation, resource circulation, promotion, event organization, basic assistance, special services, document information resources, digital information resources, hardware facility resources, space resources, software resources, human resources, characteristic resource construction, data management, hardware facility management, information resource management, software platform management, personnel management, and financial management. We constructed a public library business data system centered on user service business, resource construction business, and operation and maintenance business. This system reveals the overall framework of public library business data, provides guidance for business understanding in big data analysis, offers a foundation for digitization needs within public library operations, enables more effective integration of business data resources across public libraries, and assists in data integration. We also provided examples of big data analysis applications based on the business data system, describing analysis approaches for literature resources, user portraits, and operational business analysis, along with public library business optimization and outcome applications, expanding thinking on public library big data applications and offering inspiration for public library development strategies, resource construction, process optimization, and service innovation.

References

[1] Manyika J, Chui M, Brown B, et al. Big data: the next frontier for innovation, competition, and productivity [EB/OL]. [2019-03-24]. http://www.mckinsey.com/Insights/MGI/Research/Technology_{{{and}}}{{{Innovation}}}/Big{{{data}}}{{{T

[2] Gartner Research Institute. Big Data [EB/OL]. [2019-06-07]. https://www.gartner.com/it-

glossary/big-data.

[3] Chao Lemen. Inheritance and innovation of information resource management theory: from the perspective of big data and data science [J]. Journal of Library Science in China, 2019, 45(2): 26-42.

[4] Li Yanrui, Chen Chao, Yao Ruiquan, et al. Research on the impact of big data on intelligence work [J]. Library and Information Service, 2016, 60(S1): 179-183, 58.

[5] He Sheng, Xiong Taichun, Zhou Bing, et al. Analysis of realistic dilemmas and application models of big data services in university libraries [J]. Library and Information Service, 2015, 59(22): 50-55.

[6] Chen Tianlun. The role and tasks of public libraries in the information economy environment [J]. Library Research and Work, 2016(3): 20-22, 33.

[7] Zhang Peng. Research on precision services of public libraries in the big data environment [J]. Library Work and Study, 2018(9): 115-118, 123.

[8] Rong Chunlin. Strategy research on public library application of big data [J]. Library Construction, 2013(7): 91-95.

[9] Han Cuifeng. The impact and challenges of big data on libraries [J]. Library and Information, 2012(5): 37-40.

[10] Sun Xiaoxiao, Han Haitao. Research on library service innovation in the big data era [J]. Library and Information Service, 2015, 59(S2): 28-30.

[11] Song Ting. Application of big data mining and analysis in public libraries [J]. Knowledge Economy, 2019(3): 83-84.

[12] Yang Yan. Rational thinking on the application of big data in public libraries [J]. Library Science Journal, 2014, 36(7): 5-8, 20.

[13] Yuan Fang. Transformation of library literature resource construction models in the big data environment [J]. Library and Information Service, 2015, 59(18): 91-94.

[14] Glaser BG, Strauss AL. The discovery of grounded theory: strategies for qualitative research [M]. London: Weidenfeld and Nicolson, 1968.

[15] Wang Shanshan. Analysis of recruitment preferences in university libraries: an exploratory study based on grounded theory [J]. Shanghai University Library and Information Work Research, 2016(3): 55-58.

[16] Wang Fashuo, Wang Xiang. Influencing factors and implementation paths for government data opening and utilization in China: a qualitative study based on grounded theory [J]. Journal of Intelligence, 2016, 35(7): 151-157.

[17] Feng Guoquan. Discussion on library service transformation under internet thinking [J]. Library and Information Service, 2015, 59(2): 25-30, 16.

[18] Ye Shasha, Du Xingye. Theoretical research on user needs of mobile libraries [J]. Library and Information Service, 2014, 58(16): 50-56.

[19] Zhou Jian. Library business reorganization based on knowledge services [J]. Library Construction, 2003(6): 74-76.

[20] Chen Weijing. Smart analysis of smart libraries in the big data environment [J]. Library and Information Service, 2015, 59(S2): 49-52.

Author Contributions

Huang Wenbin: Responsible for proposing research ideas, designing research plans, and revising the final manuscript.
Liu Yi: Responsible for collecting, cleaning, and analyzing data, and drafting the manuscript.
He Bo: Responsible for conducting interviews, collecting and cleaning data, and revising the manuscript.

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