

The Application of Knowledge Management in Organizational Restructuring of Academic Libraries: A Case Study of Peking University Library

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Abstract:

A traditional library's functions are centered on literature information resources and their utilization. Their management system comprises resource acquisition, cataloguing, circulation, reading, and reference in respect of literature streams. Functionally, libraries have currently evolved into knowledge service centers, which are oriented toward knowledge, committed to achieving knowledge innovation, and centered on the knowledge demands of users. Meanwhile, library management also gradually refocuses on knowledge management. As one of China's top-level academic libraries, in recent years, Peking University Library has restructured its organizational framework and reappointed librarianships based on the knowledge streams and on a human-oriented principle. The intent is to satisfy the knowledge demands of different types of users and create an environment in favor of knowledge flow and innovation. The main point of the institutional reorganization is to transform the user service department into the Learning Support Center and Research Support Center. Taking this recent restructuring as an example, this paper discusses the application of knowledge management in the organizational restructuring of libraries.

Keywords: Knowledge management, Organizational restructuring, Peking University Library, Research support service, Academic libraries.

BACKGROUND

The functions of traditional libraries focus on the services related to literature information resources and their use. Therefore, the management of traditional libraries is based on the “literature stream” or “information stream” system, which mainly comprises the two component parts of technical services and user services. Technical services include resource acquisition, cataloguing, and preservation; user services include book circulation, reading, reference, and retrieval; and a library automation system integrates the literature streams.

In a highly developed information-based society, libraries and literature resources are no longer the only channels for users to obtain information. The focus of users' concern is not how they can obtain literature information, but how they can mine the desired knowledge accurately and quickly from the massive amounts of information and use the mined knowledge to construct

their knowledge systems for further research. In this context, libraries have functionally evolved into knowledge service centers oriented toward knowledge, committed to achieving knowledge innovation, and centered on the knowledge demands of users. Library management has gradually developed into a knowledge management system which is based on the “knowledge stream” system of knowledge acquisition, knowledge mining and organization, knowledge application, and innovation services; which also reintegrates human resources and optimizes the business process.

Peking University Library is one of China's top-level academic libraries. In recent years, it has redefined its role as a service center for learning, teaching, knowledge, and culture, and refocused its management around the knowledge stream system. Accordingly, Peking University Library has also restructured its organizational framework and reappointed librarianships. Taking this as an example, this paper discusses the applications of knowledge management in the organizational restructuring of libraries.

1 LIBRARY KNOWLEDGE MANAGEMENT ORIENTED TOWARD KNOWLEDGE SERVICES

In simple terms, knowledge management consists of passing the right knowledge to the right people at the right time. Further, knowledge management has the functions of making tacit knowledge explicit, systemizing the massive amounts of knowledge, and collectivizing personal knowledge, with the aims of creating value-added knowledge, satisfying users' knowledge demands, achieving knowledge innovation, and improving the core competitiveness of an organization (Chiu-Tzu-Heng, 2006).

From this point of view, in regard to service institutions such as a library, knowledge management covers two aspects: 1) knowledge management for external users, and 2) internal knowledge management for the library.

1.1 User Knowledge Management

User knowledge management refers to the process of acquiring, integrating, organizing, sharing, and using the knowledge desired by users, available from users, and about users (Yuan Jing, 2014). “Knowledge desired by users” refers to the users' knowledge demand and is the service content provided by a library. “Knowledge available from users” is the users' feedback about the library services. “Knowledge about users” includes the users' personal information, history about their use of library services, users' behavior records, the types of smart terminals they use, user locations, time, and real-time scenarios (for example, current active tasks).

User knowledge forms the basis for the analysis of user demand and provision of knowledge services. User knowledge is mainly available in the following stages.

Knowledge acquisition stage: The user retrieves, locates, and acquires knowledge among the massive amounts of literature information and data, including various statistical data, dynamic information, exposition and analysis information, and internal knowledge structure. The user knowledge available in this stage is mainly the user's information needs.

Knowledge organization stage: The user identifies and analyzes the acquired knowledge, summarizing and organizing it by topic, thus generating preliminary knowledge products such

as theme reports, dynamic tracking services, special-topic databases, and discipline databases. The user knowledge acquired in this stage includes not only the user's knowledge demand, but also the user's ability to organize knowledge.

Knowledge innovation stage: The user's professional knowledge is integrated into the knowledge organization services that were generated, resulting in value-added and innovative products. New knowledge is generated during this stage. The value-added and innovative knowledge products include thematic analysis, project results, industry forecasts, evaluation reports, and strengths-weaknesses-opportunities-threats (SWOT) analysis reports. The user knowledge acquired in this stage mainly includes the user's knowledge demand, innovation ability, and knowledge product level.

To sum up, user knowledge management refers to the process of acquiring, integrating, sharing, and using the user knowledge generated in the stages of knowledge acquisition, knowledge organization, and knowledge innovation. The intent is to turn tacit user knowledge into explicit knowledge, which is an integral part of the library knowledge system. Through user knowledge management, libraries will accurately understand the users and their demands, thus increasing the novelty, accuracy, and convenience of user services and improving the efficiency of users' knowledge innovation (Wang Lianjuan, 2016).

1.2 Internal Knowledge Management by Libraries

Internal knowledge management by libraries focuses on developing a mechanism for the knowledge base, specifically developing a work process for creation, acquisition, processing, preserving, spreading, and application of knowledge. Such knowledge management involves carrying out all-around and whole-process management of knowledge organization, knowledge facilities, knowledge assets, knowledge activities, and knowledge librarians in respect of knowledge streams; turning tacit knowledge into explicit knowledge; and allocating and using library resources reasonably and allowing them to play to their optimal efficiency to attain the purpose of service innovation.

1.3 Library Knowledge Management Oriented Toward Knowledge Services

The two common features below are shared by user knowledge management and internal knowledge management by libraries:

(1) Human orientation: This feature emphasizes user demand, scientific management of human resources, value mining of librarians (knowledge-based staff), implementation of abilities, and team and culture building.

(2) The knowledge stream system centered on knowledge and based on the knowledge lifecycle: The knowledge lifecycle comprises the steps of knowledge acquisition, knowledge organization, knowledge analysis, knowledge spreading, knowledge application, knowledge innovation, knowledge preservation, inception of the half-life period, and knowledge outdated, as shown in Figure 1.

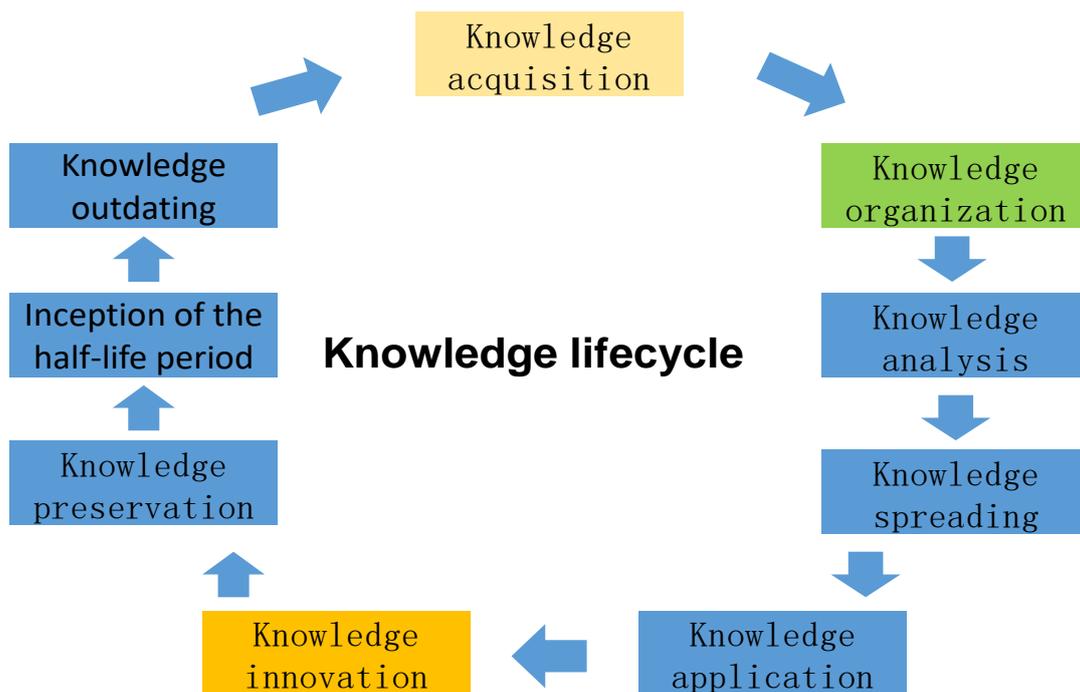


Figure 1. Knowledge Lifecycle

The library is the essence of the service organization, which determines that the aim of library knowledge management is oriented toward knowledge services. Knowledge services form the basis for enhancing the core competitiveness of libraries in the future. Specifically, knowledge services are the acquisition, rearrangement, organization, and analysis of knowledge in a problem-oriented way according to the discipline requirements of students and scholars, thus creating new knowledge services. Knowledge services differ from the traditional information services, which provide massive amounts of literature or information resources to be selected or processed by users as needed. Knowledge services, on the other hand, are a type of in-depth services and are personalized, professionalized, knowledge based, interactive, and content oriented. The fruits of knowledge services are mostly embodied in the form of knowledge products, including consultation and analysis reports, evaluation reports, dynamic monitoring reports; development forecast reports, topic databases, and discipline portals.

To build a library knowledge management system oriented toward knowledge services, it is necessary to combine external user knowledge management and internal knowledge management by libraries, and to find integrating points between humans and knowledge streams. The intent is to suit library services to users' needs and improve the knowledge services provided by libraries.

For academic libraries, business and organizational restructuring in libraries is an effective means to attain this purpose.

2 BUSINESS AND ORGANIZATIONAL RESTRUCTURING IN PEKING UNIVERSITY LIBRARY

2.1 Business Restructuring Based on Knowledge Streams

Over many years, China's academic libraries have actively provided knowledge services and tried to turn themselves into knowledge service centers, but the effect of their efforts is not obvious. Although the direction of their efforts is very clear, they have not made appropriate adjustment in organizational structure, human resources, and infrastructure. From the perspective of knowledge management, they have not successfully turned tacit knowledge into explicit knowledge.

To overcome this bottleneck and make a breakthrough, Peking University Library, one of China's largest and highest-level academic libraries, launched organizational and business restructuring in June 2015. As compared with the previous department setup based on literature streams (for example, the Acquisition, Cataloguing, Circulation, Information Service, Rare Book, Special Collection, System, and Administrative departments), this organizational restructuring was centered on user services, based on knowledge streams and gave birth to seven centers: the Resource Development Center, Learning Support Center, Research Support Center, Information Technology and Data Center, Special Resource Center, Chinese Rare Book Library, and Administration Center (Zhu Qiang and Bie Liqian, 2016).

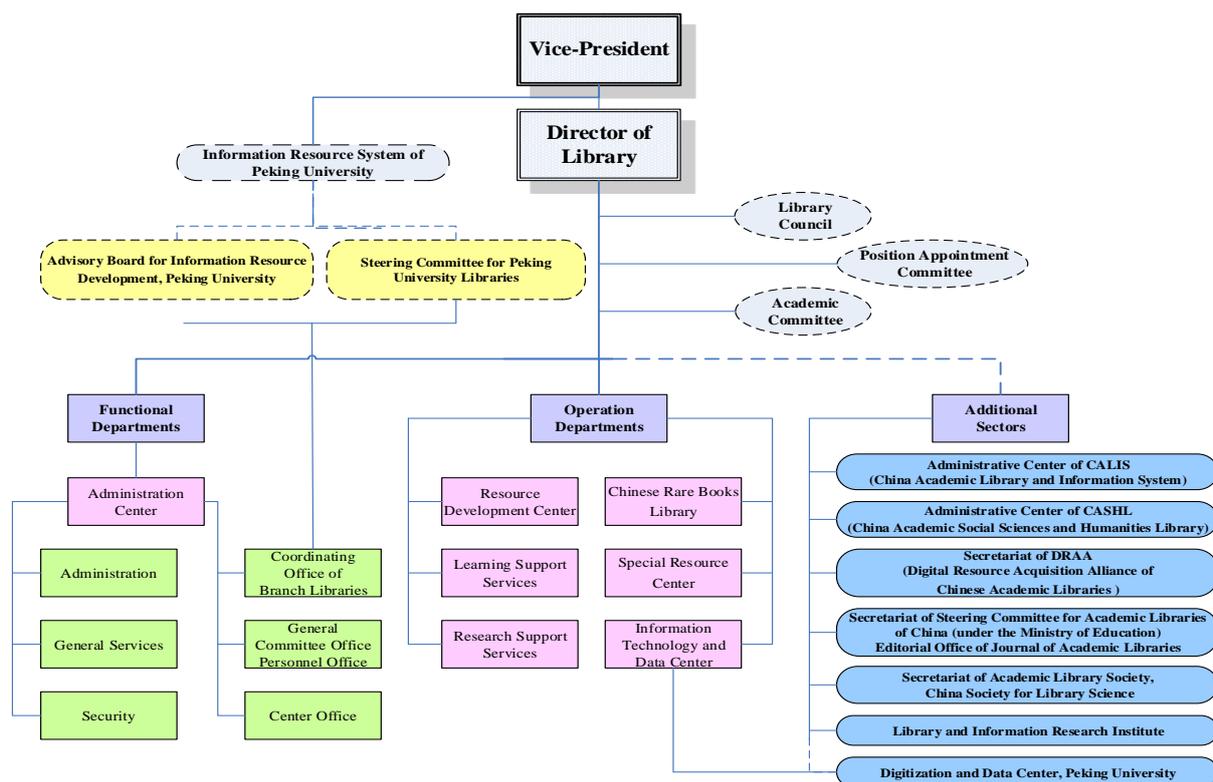


Figure 2. Peking University Library Organizational Charts after restructuring

This organizational restructuring focuses on humans and the knowledge lifecycle, and tries to find the common ground between users and the library, to suit the library services to the users' increasing demand. Table 1 describes the organizational structure, staff team, and business scope in respect to user services.

Table 1. User Service Department and Team in Peking University Library

Department	Business Scope	Leading Team
Learning Support Center	Providing all-around learning services for the users (mainly undergraduate students and junior graduate students), including: <ul style="list-style-type: none"> ● Circulation of books, periodicals, terminals and devices; ● Reserved-books and e-reserves; ● Innovation and creator services; ● Thesis and paper writing guide; ● Multimedia services; ● Interlibrary loan and document delivery services; ● Learning-oriented information literacy education, such as new-orientation, and School Open Day; ● Electronic resource services; ● General reference services; etc.	(1) Interlibrary loan and document delivery service team; (2) User service publicity and promotion team (including social media operation and maintenance).
Research Support Center	Providing all-around research services for teachers and senior graduate students, including: <ul style="list-style-type: none"> ● Subject services; ● Research project consultation; ● Sci-tech novelty search; ● Citation retrieval for research evaluation; ● Patent and intellectual property services; ● Competitive intelligence services; ● Analyses of scientific research trends; ● Applications of scientific research tools; ● Decision-making support; ● Research data support services; ● Information literacy education; ● Virtual reference services; etc.	(1) Subject librarian team; (2) Research data service team; (3) Information literacy team.

From a human perspective, this organizational restructuring is in line with the philosophy of human orientation. The Learning Support Center is dedicated to providing learning services for undergraduate and junior graduate students, and the Research Support Center is dedicated to providing research services for teachers and senior graduate students. As a result, the users' requirements and user information can be concentrated due to the common features they share, the librarians' services are dedicated and efficient, user knowledge management and internal library knowledge management are closely combined, and then, the level and benefits of user services are improved.

From a perspective of knowledge lifecycle, the learning support services are mainly concentrated in the stages of knowledge acquisition, knowledge spreading, and knowledge application; and the research support services are mainly concentrated in the stages of knowledge organization, knowledge analysis, and knowledge innovation. Along with the services provided by other centers, the Library just constitutes a complete knowledge stream system.

From the perspective of knowledge management application, this business restructuring of the Peking University Library has successfully broken the old organizational framework and work procedure, and has given birth to a new mechanism that combines user knowledge management with the library internal knowledge management and is committed to turning tacit knowledge into explicit knowledge. In sum, a great breakthrough has been made in the business scope, work procedures, human resource development, and team building.

2.2 Innovative Development of Research Support Services

Over the two years since this business restructuring, user services have been gradually adjusted and transited, and a great breakthrough has been made in many respects. This is exemplified by research support services.

Based on the lifecycle of scientific research, research support services are the supporting knowledge services provided for scientific researches of universities, enterprises, and other social institutions through various research infrastructure and related measures, with a view to satisfying knowledge and information needs in different research stages (Xiao Long and Zhang Chunhong, 2016). Research support services are mainly intended for teachers, graduate students, scientific researchers, and scientific research managers of universities and colleges, as well as for the related personnel of enterprises. Peking University Library mainly provides the following research support services: scientific research support services, decision-making support services, research data support services, scholarly publishing services, intellectual property rights and patent information services, information literacy services, reference services, and others.

Since Peking University Library launched organizational restructuring, a supporting platform for research support services has gradually come into being as shown in Figure 3.

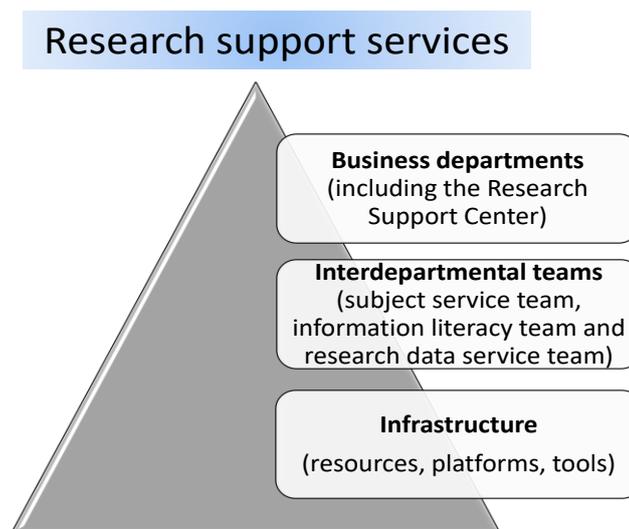


Figure 3. Research Support Service Supporting System

Functionally, the Research Support Center further comprises groups as described in Table 2.

Table 2. Job Description for Research Support Center of Peking University Library

Business Group	Job Description	Post Setting
Subject service group	Assigning subject librarian teams to the four academic divisions of Peking University (Science, Information and Engineering, Humanities, and Social Science), appointing subject service leaders and subject librarians, recruiting librarians with appropriate discipline background and reference experience, and thus forming the subject service team, and providing all-around innovative subject services (including the integration of discipline resources, improvement of disciplinary information literacy, and support of disciplinary scientific research), to create a new format of discipline services.	Four subject service leaders; Subject librarians; An interdepartmental discipline service team.
Information literacy group	Expanding the existing information literacy system to incorporate information literacy education into the teaching appraisal systems of Peking University, and thus developing a complete information literacy education system that covers a wide range and a whole process: for example, from entrance to graduation, from students to teachers, and from the general area to specific disciplines and even specific courses. In conjunction with subject services, deepen the embedded information literacy services and incorporate digital literacy, media literacy, and data literacy into the information literacy system.	One information literacy leader; An interdepartmental information literacy team.
Scientific research support group	Providing fundamental scientific research support services (including citation retrieval for research evaluation, project consultation, and sci-tech novelty retrieval) constantly and efficiently; providing patent novelty retrieval and intellectual property services, and supporting the transformation of Peking University's scientific research achievements. Tracking discipline forefront information and analyze discipline trends, thus providing decision-making support for disciplinary development. Providing information services regarding disciplinary competitiveness and strategic analysis. Providing all-around support for discipline evaluation. Developing a library-oriented general method and index system for scientific research and decision-making support.	One leader; A few librarians

Research data service group	In conjunction with related departments (for example, the Information Technology and Data Center), acquiring, preserving, and processing the data of different disciplines, and providing data services; mining and analyzing discipline user data, deeply understanding the information and knowledge demands of different discipline users, and tracking their dynamic change, so as to provide decision-making support for various services (including discipline services), resource development, and development of the library. Developing whole-process research data support services; Assisting and leading the users to acquire, analyze, manage, and share scientific data (especially the use and management of open data); Strengthening the work in data literacy, data analysis, data normalization, and quality control.	One leader; A few librarians An interdepartmental research data service team.
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In addition to organizational restructuring, a reorganization of infrastructure is also under way. The infrastructure includes the diversified literature resources, subject librarian service platforms (for example, Libguides and the VIP subject service platform), discipline portal platforms (for example, the Marine Information Portal), and the commonly used data resources and related data processing and analysis tools (for example, Incites, ESI, SciVal, Innography, TI, SPSS, and CiteSpace).

It is worth mentioning that the ecological system of Peking University's academic achievements developed by the Peking University Library formally went live in December 2015. This ecological system comprises four platforms: the Peking University institutional repository (PKU IR) , Peking University journal net (PKU OAJ) , Peking University Open Research Data platform , and Peking University scholar homepage (Scholars@Peking University) . The services provided by the four platforms cover the whole academic production process (from intermediate products to final results) and diversified key nodes (from authors to publications). These services are independent but are also closely linked with each other, thus constituting a relatively complete ecological system for academic achievements. The four platforms provide a sustainably developing ecological environment for the users' academic exchange activities and the library's research support services.

One year after the organizational restructuring, the research support services of the Peking University Library have experienced great development and produced a series of achievements. Today, the research support services are becoming increasingly influential in Peking University and academic libraries in China. The main information products are described as follows:

- ***Weiming Academic Express***: Edited and released independently by Peking University Library, Weiming Academic Express is an information product that provides supporting services for scientific research and academic activities. It is committed to acquiring objective data, showcasing the academic achievements of Peking University, corroborating the academic judgments of experts, supporting the academic research of experts, and accompanying Peking University in stepping toward a world first-rate university. It was initially released in January 2016 and is issued four to six times every year. The print edition and electronic edition are issued at the same time. In June 2016, the

Microblog of Weiming Academic Express formally went live. Ever since its release, it has drawn wide attention among the teachers and students of Peking University and the administrative departments. It has gradually developed into a well-branded information product through which Peking University Library provides research support services and releases Peking University's academic information dynamically .

- ***Analysis Report on the Patent Competitiveness of Peking University***: This report summarizes and analyzes the patent status of Peking University in different aspects, for example, the number of granted patents, number of high-strength patents, patent hotspots, and patent transformation. This report compares the patent status of Peking University with those of other universities of its type and grade, analyzes its patent competitiveness among China's universities, and points out the university's dominant direction. Finally, this report analyzes the existing problems of Peking University in terms of patent output. This report plays an important role in promoting the sustainable self-dependent innovation of Peking University . It has won unanimous acclaim among not only the university's related administrative departments, but also the university's librarians and research personnel in the related disciplines. The related schools and faculties of Peking University subscribe to the full text of this report, and a number of academic libraries also come to communicate deeply about this report or want to learn something from it.
- ***Analysis Report on the Publication of Mainland China's Research Articles, and Analysis Report on the Publication of Mainland China's Articles in Humanities and Social Science***: Commissioned by the Ministry of Education and Peking University, these two reports are problem-oriented advisory reports on scientific research decision making. The reports analyze the publication of Mainland China's research articles in the following aspects: 1) overall trends in the quantity and quality of published research articles, and comparison with the United States; 2) trends in the quantity and quality of published research articles in different disciplines, and comparison with the United States; 3) trends in the quantity and quality of research articles published by different universities, and comparison with universities across the globe. The reports argue that China should develop a reasonable evaluation system to evaluate the personal achievements of scientists and the research performance of scientific research institutions, and should also give correct guidance to the orientation of the input of scientific research resources.
- ***Research on Hotspots of Scientific Research Strategy Oriented toward Basic and Cross Disciplines***: Relying upon key research projects sponsored by the Ministry of Education, Peking University Library actively studies and taps the research hotspots in different disciplines of China's universities and Peking University in conjunction with the Scientific Research Division of Peking University. In response to the needs of research projects, the Research Support Center of the library has completed the analysis of the hotspots in 20 areas of specialization, including: aeroengine test, automobile engine test, superconductivity, photosynthesis, carbon materials, high-temperature materials, laser devices, terahertz, combustible ice, visible light communication, laser accelerators, carbon-based integrated circuits, vehicle-mounted batteries, memristors, high-strength carbon fibers, high performance membrane, robot (artificial intelligent), nitrogen fixation, spin-electronics, dark matter. During this successful effort, Peking University Library has actively responded to national strategic needs, tracked the international cutting-edge disciplines, used the bibliometrical method, and made the best of its diversified digital resources and analysis tools. This research project has received wide acclaim in library

circles and the related fields because it focuses on the strategic planning of hotspot disciplines.

- ***Analysis Report on the Discipline Competitiveness of Peking University*** (in series): This report compares the discipline competitiveness among 18 universities, both in China and abroad. Based on multidimensional bibliometrics and intelligence analysis, it analyzes the competitiveness of the first-level disciplines in the 44 doctoral stations of Peking University. This report is intended to provide supporting services for the discipline construction and development of Peking University .
- ***Discipline information portals***: For specific disciplines or interdisciplinary areas, Peking University Library develop academic information portals, which integrate the literature resources (including periodicals, books, data, and proceedings), research hotspots, dynamic information, research institutions and proprietary academic achievements. The portals provide one-stop academic content services, for example, analysis reports on disciplinary trends, academic resource recommendations, and academic evaluation of scientific research. The portals currently in process include the Marine Academic Information portal, custom made for the Marine Strategic Research Center of Peking University . In addition, Peking University Library will launch academic information portals for mathematics, pedagogy, archaeology, cultural relics and museology, information management, and economics and management science.

3 CONCLUSION

Library knowledge management is rooted in, but different from, business management. Library knowledge management includes user knowledge management and internal knowledge management by libraries. In addition, library knowledge management should also be knowledge centered and human oriented. As exemplified by Peking University Library, the restructuring of library business based on knowledge management enables a library to break the old business system; establish a new mechanism; tap the potentials in the work procedure, human resources, and team building; and achieve innovative development. As the saying goes, an egg broken from the outside means only food and destruction; but if broken from the inside, it means rebirth.

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