

# Research on Information Resource Integration of University Libraries under the Mode of Knowledge Management

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## ABSTRACT

On the grounds of expounding the situation of university library knowledge management and according to the characteristics of knowledge management, the paper combines the development of resource integration of library of Wuhan University of Technology, and analyzes the objects, trends and innovation of resource integration under the mode of knowledge management.

**Keywords:** Knowledge Management; Resource Integration; University Library

## 1. Introduction

The core of knowledge management is “people-oriented, service paramountcy”. Therefore, library information resource integration under the mode of knowledge management means to use the theory and methods of knowledge management to guide library management and lots of practices, to make library’s information resources to form an organic whole, and offer high quality and effective information service to users, and ultimately realize the philosophy of “readers first, service-oriented”.

## 2. University Library Knowledge Management

### 2.1. Knowledge Management

Knowledge management refers to establish knowledge system within the organization, acquire, create, organize, disseminate, analyze, develop and utilize the explicit knowledge and tacit knowledge in internal and external organization and make knowledge resources be used effectively.

University library knowledge management is a knowledge system based on knowledge management, which consists of two elements: information resources and users. Information resources refer to all kinds of library resources including hypostatic library collection and virtual library collection; users refer to the individuals or groups who use library resources to meet their information needs.

### 2.2. Practice of University Library Knowledge Management

The attention of university libraries to knowledge management can be reflected in knowledge management practices and trials of university libraries or academic libraries. Knowledge management practices of university libraries mainly have three types: repository-oriented knowledge management, library staff-oriented knowledge management, new technology-oriented knowledge management.

The typical cases of repository-oriented knowledge management mainly contain Ohio State University Library and MIT Library [1]. In 2001, knowledge management of Ohio State University Library advanced through the participation in Knowledge Bank Plan, in which library takes charge of managing knowledge bank and university personnel or departments realize creating, organizing, storing and using academic information freely, promoting knowledge sharing, knowledge communication and knowledge dissemination and making the individuals get more closely with the organization. Knowledge management of Ohio State University Library is a successful case of library knowledge management. Knowledge management practice of MIT Library is based on the establishment of open access DSpace, and MIT Library currently is working with Columbia University, Cambridge University, Ohio State University and other universities to set up inter-university Dspace alliance, realizing knowledge sharing and co-management between universities, and promoting the progress of open

access movement. Repository-oriented knowledge management focuses primarily on the using of knowledge resource, although some university libraries are focusing on the affinity of interface, but information resource-based knowledge management rarely reflect the importance of library staffs and users in the knowledge management system.

Establish learning organization to manage library knowledge resource belongs to library staff-oriented knowledge management, and the typical cases include Library of University of Arizona, Northern Illinois University Library. University of Arizona establishes different function groups to take charge of specific work, focusing on cultivating staffs' abilities and advocating share and building self-management team, utilizes users' feedbacks to improve working process, sets up internal evaluation mechanism, and initially forms a scientific knowledge management system of library staffs. Through the building of knowledge management system, University of Arizona not only promote the staffs' abilities and improve library workflow, but also reduce library costs and improve the service quality. Staff-oriented knowledge management lays emphasis on the management, lacking of effective means to use knowledge resources.

Library resource integration is technology-oriented knowledge management, integrates library resources into a union knowledge management platform, and provides one-time user authentication, one-stop search, original document acquisition and some other knowledge services. University libraries have carried out a lot of practice on resource integration, and have introduced lots of resource integration systems to manage internal resources. The common resource integration systems include Ex Libris' MetaLib/SFX, Web Feat's Web Feat Prism, MUSE, Elsevier's Scopus, OCLC's Worldcat, and duxiu academic search.

### 3. University Library Information Resource Integration

Information resource integration is the optimization combination of digital resources, integrate, cluster and restructure the relatively independent data objects, function structure and interactive relationship to recombine into a new organic whole, and form a new information resource system of better performance and more efficient. The degree of integration can be directly related to the efficient absorption and utilization. The model of library information resource integration can be divided into two categories: resource-oriented information resource integration and user-oriented information resource integration [2].

#### 3.1. Resource-Oriented Information Resource Integration

Resource-oriented information resource integration mainly

utilize database and data warehouse to organize a variety of heterogeneous scattered information resources, optimize the structure of information resource system, and use artificial intelligence technology to offer integration service. Integrated information resources can eliminate the isolation between library collection resource, digital resource and heterogeneous resource to become a more systematic and professional system.

##### 3.1.1. Objects of Resource-Oriented Information Resource Integration

The objects of resource-oriented information resource integration include hypostatic collection, virtual collection and network free resource. Hypostatic collection mainly refers to paper resource, electronic collection, self-built characteristic database and multimedia resource; virtual collection mainly refers to a variety of databases, network free resource refers to the open access resource, including academic news, academic conference information, expert information, universities and research organizations, open-access journals, free e-book, free software, shared courseware, excelsior courses and researchers' blogs.

The objects of resource-oriented information resource integration should also include tacit knowledge. The concept of explicit knowledge and tacit knowledge was advanced in 1958 by Michael Polanyi, physicist, chemist and philosopher, from the philosophy. Tacit knowledge refers to the knowledge we know but of unspeakable or unexpressed, such as the human experience, skills and cognitive ability. Library tacit knowledge has two sources: first, from the library staffs; Second, from the library users. As a part of the objects of library resource integration under the mode of knowledge management, the key to obtain tacit knowledge is how to makes tacit knowledge explicit.

##### 3.1.2. Development of Integration Mode

Faced with various information resources, users propose new needs on library information service, demand one-stop search on union platform for all resources to obtain more relevant literature, more efficient full-text acquisition service, citation and references, authors, institutions and other relevant information service.

Driven from these new requirements, Information resource integration develops from digital resource integration based on OPAC, digital resource integration based on data source to digital resource integration based on knowledge link, from directory service to full-text search service, to resource integration service based on knowledge unit and knowledge link.

Resource integration service based on knowledge unit and knowledge link is more advanced model of information resource integration. According to heritage and logic of knowledge node, organize the relevant knowledge units to form different knowledge sets of different use, and finally form a knowledge network. OPAC-based inte-

gration and data source-based integration have matured gradually, and university libraries pay more and more attention to knowledge link-based integration. For example, duxiu academic search platform is the resource integration platform based on knowledge link.

### 3.2. User-Oriented Information Resource Integration

User-oriented information resource integration means information resource integration carried around users, to form a dynamic mechanism of aggregating information resource, information service and information utilization activities, with the ultimate goal of becoming the support platform for using information, extracting knowledge, solving problems and optimizing user environment, in order to enable users to get positive experiences during the combination of information resources and individual needs [3]. Specifically, user-oriented information resource integration is not only the integration of information resource but also the integration of information service, that is the organic integration of information resource and service.

Such as RSS and My Library are the typical modes of user-oriented information resource integration, and integrate library information resources and service to provide users with personalized service and information push service. The typical feature is the interaction between users and library.

The ultimate goal of information resource integration is to improve the quality of information service. Although the integration based on information resource can bring convenience to users, but the level of users' participation in the process of integration is not high, results in the mismatch between service and needs. In this case, user-oriented information resource integration caused a lot of concern in the circle of library. User-oriented information resource integration focuses on users' experiences, and integrates information resource and information service according to users' demands. In some ways, resource-oriented integration is the basis of user-oriented integration, and user-oriented information resource integration is the advanced process of resource-oriented information resource integration. Only resource-oriented integration develops to certain extent, user-oriented information resource integration can be achieved. With the development of technology and the update of conception, information resource integration will develop towards an integrated and comprehensive approach.

## 4. Practice of Information Resource Integration of Library of Wuhan University of Technology

Library of Wuhan University of Technology (WUT li-

brary) started to integrate information resources from 2005, and by 2009 have integrated information resource three times. Generally the phase of resource integration, that is information resource-oriented integration, is just the early stage of information resource integration. Although resource integration can provide personalized service, the extent and scope of library service are still unsatisfactory from the view of practical application. From the second half of 2009, Library started to user-oriented integration of subject information resource, and integration program has taken initial shape [4].

### 4.1. Information Resource-Oriented Integration

In the project of digital library construction started in 2005, in order to realizing co-construction and sharing between 6 branch libraries and 22 college/department reference rooms in library system, library introduced Interlib system in 2006. Library uses cluster management solution to integrate OPAC resource. Interlib system integrates the resources of college/department reference rooms and library to form a virtual library, realizing the integration of information resource. Integration platform integrates union certification, personal loan, online renewal, book recommendation, new books bulletin and book reservation to provide user-oriented bibliography search service.

In order to satisfy the needs of users, library completed union search platform for CALIS resource in 2007. The platform is based on data source integration, integrated print resource, electronic resource and self-built resource such as CD-ROMs attached books through metadata repository, and provided union search and full-text service through resource scheduling system. CALIS resource union search platform can retrieve the majority of library resources, and integrate union user authentication system, library portal, online reference service, interlibrary loan system, library BBS, resource navigation, CALIS toolbar features and personalized service such as my favorites, search history, my discipline and resource list. Due to the limitation of library resource integration and technology development, CALIS resource union search platform has become increasingly unable to meet the needs of users, reflected as follows:

- The platform can not provide users with network academic information resource because of the range of integration.
- Technical defects. First, the platform can not integrate all the resources available; second, problems exist in recall ratio and precision ratio of the search results, and union search result is inconsistent with single database search result; third, the clutter sort of search results does not reflect the correlation between resource and search terms.

- Because of the resource integration based on data source, search results do not reveal the knowledge relation of the resources, and the relationship of resources can not display through search results.

Development of new technologies and changes of the conception of resource integration provides the opportunity to solve the problems in the original integration platform. WUT library started to pay attention to knowledge link-based resource integration platform from the first half of 2009. After the search of MetaLib/SFX, Web Feat Prism, MUSE, Scopus, Worldcat, and Duxiu academic research, library introduced Duxiu academic research in September, 2009. Duxiu academic research platform can deeply retrieve the resources and the full-text contents and provide document delivery service for the resources outside the library.

There are some differences between Duxiu academic research platform and CALIS resource union search platform:

- Expand of collection range. Duxiu academic research platform provides 21 kinds of resources including knowledge, books, journals, newspapers, e-books, patents, standards, figures, entries, dictionaries, dissertations, conference papers, blogs, forums, online papers, web pages, pictures, movies, music, yellow pages, and news [5]. In addition to the integration of academic resources, Duxiu academic research platform also integrated network academic resources and personal resources.

- Technical solutions get better. Duxiu academic research platform integrate different resources seamlessly, offer the users with integrated service including book-loaning and book-query in Interlib system, reference service based on Duxiu academic research, document delivery service and personalized push service. The speed of retrieval response has a significant improvement, and the sort of search results is more scientific.

- The search result is a set of knowledge relation. Duxiu academic research integrates resources based on knowledge link, and reveals the internal logic of the resource. Therefore the search result is no longer linear, and becomes a set of books, journals, authors, web resources, conferences, patents and standards. Through knowledge units provided by search result, users can access relevant information more quickly.

- Reveal resources more depth. Take book for example, Duxiu academic research reveals catalogue information including cover page, title page, copyright page, preface page, directory page, probation page and back cover page. Duxiu academic research also provides collections, document delivery, recommendation and some other access methods.

- Personalized service and learning organization service become more active. Duxiu academic research introduced my library, subject library, document mutual aid,

document market, my reference and other characteristic services to address the needs of different types of readers.

- Managing tacit knowledge and providing service. Duxiu academic research has begun to make use of user's tacit knowledge to create knowledge. For example, through the establishment of subject library, user can collect subject data to do personal creation, and this is the creation of tacit knowledge.

#### 4.2. Second Phrase: User-Oriented Subject Information Resource Integration

Resource integration under the mode of knowledge management not only integrates hypostatic collection, virtual collection and network academic resources, but also integrates tacit knowledge resource. Duxiu academic research involves in tacit knowledge just in subject library. The key to make users' tacit knowledge explicit and use the knowledge by knowledge link is user participation.

User-oriented subject information resource integration is the focus of WUT library research project and the practice of resource integration under the mode of knowledge management. The project aims at the establishment of interaction based on user-oriented information resource integration. The project clusters information users through the behaviors of the users, divides the users into different groups of the same or similar research topic, enable them to create virtual research teams through the network, and establish the interactions and links between users and users, users and library. Users can communicate with each other, interact with the library, and participate in the construction of library resources. Library mines the tacit knowledge through the participation and using of the users, in order to achieve the purpose of making tacit knowledge explicit.

User-oriented subject information resource integration has the following characteristics:

- More features integrated. Knowledge Platform not only integrates library knowledge resources, but also integrates the existing user authentication system, library automation system, information retrieval system and remote access system, and configures document management function for users.

- More abundance of the content of information resource integration. The platform not only integrates hypostatic resource and virtual resource, but also integrates network resource, can track and analyze characteristic information by using effective technical means and create tacit knowledge repository for the users.

- Service of more personalized features. Through the analysis of the data in tacit knowledge repository, the platform makes tacit knowledge explicit, finds and offers the proper information to the user according to the per-

sonalized needs of users. For example, through keyword search, users can get relevant research organizations, researchers, research progress, research achievements, the hot spots and other information resources, and obtain the research field of peers by the analysis of tacit knowledge. The “active” display of these resources allows the platform users to get the research information of other peer researchers, eliminating the vast work of information screening.

- Providing the platform for virtual teams to communicate and study. The project reveals the internal logic of knowledge units, and analyzes the inherent relation of knowledge units and clusters the knowledge resource freely. Analyzing the user behaviors and strengthening the understanding between users, the project allows users to cluster and establish virtual research teams, and team members can discuss and communicate through the network.

- Revealing knowledge deeper and using knowledge fully. Through the establishment of meta-data repository to build knowledge relations and knowledge links, the project clusters the same and relevant knowledge, reveals knowledge resources more fully and provides users with knowledge clustering retrieve, knowledge navigation and other services.

## 5. Conclusion

Information resource integration under the mode of knowledge management changes the functions of library in the process of knowledge exchange: expansion of the

service space, library not only provides physical space for learning and communication, but also provides the platform for virtual learning and communication; deepening of the service content, library service develops from information service to knowledge service which means that library provides knowledge-based service from the perspective of library experience and expertise; expansion of the scope of knowledge management, library mines the tacit knowledge for users, and enhances the professional service. Based on these function changes, library service transforms from previous independent and reverse passive service into interactive service.

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