

Research on Development Paradigm of the University Library

Yanhong Yang

Newspapers and Periodicals Office of Chifeng University
Chifeng, Inner Mongolia, 024000, China

Abstract—This paper studies the development paradigm of the university library from the traditional library to the compound library and then to the smart library. From the traditional library to the compound library under construction, we have experienced the digital construction of the traditional library and the coexistence of paper literature and electronic literature. What is more, the compound library with the coexistence of traditional and digital paradigms is formed. From the compound library to the future smart library, it is not only the result of the application of modern information technology in the university library, but also the innovation and development of the university library, which meets the requirements of talent training in colleges and universities and scientific research on library.

Keywords—University library; Traditional library; Digital library; Compound library; Smart library

I. RELATED CONCEPTS

A. Library

In colleges and universities, the library is the center of literature information resources, an academic institution for talent training and scientific research, and an important base for the construction of campus culture. The university library performs the function of education and information service in the process of performing the talent training, scientific research, social service and cultural inheritance and innovation. The performing function level of university library is one of the important signs of the school's overall level[1].

B. Library Development Paradigms

Pattern refers to the form or style that can be imitated, that is, the pattern generally refers to the form or style of ordinary things that can be imitated[2]. Kuhn(1962), an expert on philosophy of science (1962), holds that the paradigm refers to the accepted pattern followed by scientific communities in scientific activities, that is, paradigm mainly refers to the pattern in the field of science. As the academic institution of a university, the development pattern of library can be called the library development paradigm[3].

C. The Elements of the Library

In general, libraries have elements such as librarians, users, premises, equipment, literature information resources, technology, services, management and so on. Taking the library as the service organization, the main elements of the library are service subject (librarian, etc.), service object (user), service content (literature information resource), service mode (information processing, transmission mode, etc.), service conditions (premises, equipment and so on).

II. FROM THE TRADITIONAL LIBRARY TO THE COMPOUND LIBRARY

A. From the Traditional Library to the Digital Library

The literature information resources of traditional library are mainly papy literature, which mainly provide paper literature title or fragment information. With the development of electronic technology, communication technology and computer processing technology, the university library has the ability to transform the text book image of the paper literature into the electronic text image. Thus, the digital library, which uses the digital ways to collect, store, classify and organize paper literature information resources, and then further uses digital ways to borrow, browse, and retrieve electronic resources, emerges as the times require. The research of digital library in China began in 1994, and the construction of digital library began with the "211 Project" higher education literature guarantee system launched in 1998. In 2001, the national digital library project was approved and built. During the "12th Five-Year" period, the state carried out the digital library promotion project in the whole country. At the end of 2015, the national digital library promotion project involved 40 provincial libraries, 479 municipal libraries and 2900 county libraries [4]. At the same time, China has formed China Academic Journals Full-Text Database, VIP Chinese Sci-Tech Journals Database, Wanfang Digital Journals Database, Foreign Electronic Periodicals Database, Superstar Digital Library Database, Database of Copy of Newspapers and Periodicals of Renmin University of China, and other digital literature information resources database [5].

B. Mobile Library as a Form of Digital Library

Mobile library services began with the mobile bibliography query system of the Toyama University library in Japan in September 2000, and for the first time, the library mobile service functions such as online bibliographic query, appointment and instant notification are first implemented. In 2003, Beijing Institute of Technology and South China University of Technology first launched mobile library services in China to achieve online retrieval. Subsequently, the National Library and the Shanghai Library opened mobile library services such as electronic journal reading, e-book reading and so on. At the end of 2014, in 116 “211 projects” university libraries, 96 libraries opened the mobile library service, and in 31 provincial public libraries, 25 libraries opened the mobile library service.

At present, the mobile library service in colleges and universities is mainly based on WAP service. Using mobile library service in colleges and universities, the teachers and students can realize online query, literature retrieval, periodical reading, paper reading and so on, so as to realize the new service form, such as fragmentation of reading time, personalized library service and efficient use of library. On the whole, the mobile information service in China’s libraries has such problems as insufficient popularization, low utilization and incomplete service.

C. Compound Library Based on Tradition and Digit

1) Intelligent Library

With the development and application of modern information technology, digital libraries and mobile libraries have been developing rapidly. On this basis, the main form of library intelligence is the technology library[6]. At this time, the university library fully uses mobile communications, wireless networks, Internet of Things, digital maps, mobile positioning, cloud computing, near field communication, two-dimensional code, intelligent perception, big data, digital mining and other user identification, information retrieval and artificial intelligence technologies, obtains effective information resources from big data, gradually realizes the library service turning from literature unit processing to knowledge unit processing and from literature lending service to information processing, information retrieval, information management, information organization and other information services, and becomes the intelligent service platform integrating literature information collection, processing, sorting and dissemination, with a coordinated process of information research, reference consultation, special topic retrieval and regular tracking [7].

2) Compound Library

The compound library is an intelligent service platform based on the academic level of librarians, with the modern information technology as the means, with the user demand as the center[8]. On this intelligent service platform, the embedded service becomes the necessary work for librarians. The embedded service was put forward by American scholars in 2004[9], which mainly refers to the process and results of the university librarians integrating to teaching and scientific research and providing information resources for teachers and students according to their needs. The research on embedded services in Chinese university libraries began in 2008[10]. The embedded service in colleges and universities mainly means that the librarians are embedded in the teaching and scientific research, carry out the subject introduction, the classroom service, the introduction of resources and so on. Through the point-to-point and face-to-face way, the librarians can provide the service of the retrieval strategy and information resources directly to the teachers and students, thus improving the efficiency and the level of the teaching and scientific research.

The compound library provides the foundation and conditions for the University Alliance. As mentioned earlier, the “211 project” literature guarantee system of higher education, launched in 1998[11], has already realized the alliance of more than 100 university libraries, established four national literature information centers of National Information Center in Science, Social Science and Humanities, National Information Center in Engineering, National Information Center in Medicine and National Information Center in Agriculture, and the alliance of literature and information centers in eight regions of Northeast China, Southeast China, Central China, Southern China, northwest, southwest, northeast and national defense. The resources of the alliance include the joint catalogue of Chinese and foreign books and periodicals, the current periodical contents of the university, the database of academic dissertations, the database of key subjects, the navigation library of network resources in key disciplines, the introduction of foreign databases and electronic documents, and have developed the online cooperation, online retrieval, interlending, literature delivery and other services. In 2000, four libraries of Chinese Academy of Sciences, National Engineering Technology, Chinese Academy of Agricultural Sciences and the Chinese Academy of Medical Sciences jointly established a virtual science and technology information resource institution. According to the principles of unified procurement, distribution processing, joint Internet access and resource sharing, there were nearly 4000 kinds of Chinese science and technology periodicals, 13000 western science and technology periodicals, and 3000 western conference documents [12].

III. FROM THE COMPOUND LIBRARY TO THE SMART LIBRARY

A. *Smart Library*

The smart library was put forward by the Finland scholar in 2003[13]. The university library of China started the research and practice of smart library in 2005[14]. It is believed that the smart library refers to the library service mode that provides users with smart services based on the Internet of Things and cloud computing technology taking the intelligent equipment as the means. It is also considered that the smart library refers to the library that deals with big data information by intelligent equipment and implements intelligent management and services under the support of the Internet of Things and cloud computing technology. In addition, some studies believe that the smart library is based on paper resources and digital resources, with the network, digital and intelligent information technology as the condition, with the Internet of Things as the carrier, with the high efficiency, interconnection and convenience as the characteristics, and provides smart library services by using cloud computing, big data and other technologies. According to the needs of teachers and students, the smart library provides personalized knowledge system and scientific research solutions through advanced technologies such as intelligent equipment, Internet of Things, cloud computing and so on, and then realizes the service paradigm of the smart library. In particular, with the help of big data technology, through the collection and storage, information mining, information prediction, and so on, the library can realize the smart library services such as identifying collection information, processing transmission information, intelligent management, humanized service and so on.

B. *The Technical Path of the Smart Library*

The advanced technologies such as Internet of Things, cloud computing and big data based on Internet are integrated to achieve information resources sharing. Using RFID, intelligent communication and intelligent Internet of Things, library presents intelligent form. Internet of Things technology extends the Internet user and user end to objects and objects. Cloud computing is the collection and development of distributed computing, parallel processing and grid computing. Through RFID (radio frequency identification technology) and Internet of Things technology, library networking building environment, literature resources, equipment, readers' credentials and so on [15]. The RFID technology realizes the full automatic search and utilization, the cloud computing platform realizes data connection and data sharing, the data mining and other technologies can effectively discover and integrate the data, and the semantic annotation technology annotations and digs the content of the digital document, and extracts it through the intelligent search system.

C. *The Management Path of the Smart Library*

The smart library pays attention to the intelligent integration cluster and collaborative management, pays attention to the intelligent ubiquitous, convenient and cross temporal reader services, and is concerned about intelligent innovation and development and people oriented. The smart libraries, through intelligent technology, integrate the interconnection and perception into the various services and processes of the library, and integrate the convenience and integration into the foreground and background and the hardware and software of the library through intelligent management. Under the comprehensive perception and wireless ubiquitous condition, the smart library provides anytime, anywhere and optional services for anyone. At this time, people and people, people and objects, and objects achieve the depth perception, and the library realizes the automatic identification, management and service.

D. *The Subject Librarian of the Smart Library*

The most important meaning of the university library to become a smart library is to become an academic library and a knowledge-based library, which is because the network has made the library no longer the distribution center of the main literature resources. University libraries must face the academic needs of university teachers and students and become academic and knowledge-based information service centers. In the age of the smart library, librarians should transform from the subject background oriented type to the subject teaching oriented type, while the embedded subject service is the main way for the intelligent library to serve teaching and scientific research. Subject teaching librarians are integrated into the subject, to understand the development trend of scientific research, to master the literature resources of teaching and scientific research, to undertake the service work of scientific research of the subject, to exchange and guide the academic process of the scientific research, and to efficiently and accurately complete knowledge mining, practice and integration, and knowledge management and transmission.

E. *The Knowledge Service of the Smart Library*

The knowledge service refers to the process and results to deeply excavate the knowledge resources of the library, and realize knowledge increment and knowledge innovation according to the needs of the users, with the help of intelligent technology and intelligent management. Knowledge services generally provide users with a set of solutions to solve problems [16]. The logical route of knowledge service is to excavate, acquire, analyze and innovate knowledge products solving user problems in the literature resources according to the needs of users, then push the knowledge products to the users with the appropriate technology, then mine again, analyze and innovate the better knowledge products according to the further needs of the users and push them to the users, and finally intelligently analyze problems and use big data to predict. Knowledge service can be either a personalized service that provides knowledge products for user's personal needs or a disciplinary service that provides knowledge products for discipline organizations. In general, it mines the

integrated system knowledge, mines analyzed related knowledge and mines innovative method knowledge. In the process of knowledge service, the library provides the users with knowledge products through data mining, knowledge acquisition, knowledge integration, association analysis, knowledge assessment, knowledge dissemination and so on. The knowledge service of the smart library also provides knowledge navigation services for users, such as literature resources navigation, subject knowledge navigation, and it also provides the citation links, author links and other knowledge linking services, as well as interactive, cooperative and other knowledge consulting services.

IV. CONCLUSION

As an academic institution that provides literature information, the university library supports universities to fulfill their functions of talent training and scientific research. The university library from the traditional library to the compound library under construction, and then to the future intellectual library is the necessary requirement to improve the quality of talent training and scientific research level. Theoretically discussing the development paradigm of university library is the foundation of the construction and development of university library. In practice, the construction of university libraries needs many factors, such as the type of comprehensive schools, the orientation of development, the conditions of running schools and so on. With the development of modern information technology, the construction, development and development paradigm of university libraries will show more and more styles and forms.

REFERENCES

- [1] Hao Wang, Bing Liu and Linlin Zhang: Research on the Development of University Library Information Service Model in the Era of Big Data[J], *New Century Library*, 2016(2): 14—17.
- [2] Fengyu Wu: The Development Mode of University Library in 21st Century[J], *Researches In Library Science*, 2013(3): 7—10.
- [3] Chunguang Song: Construction of University Library Development Mode Based on Digitalization Background[J], *Estate and Science Tribune*, 2014(8): 241—242.
- [4] Yong Zheng: Research on the Development Status and Innovation Mode of University Libraries Based on Supply and Demand Balance[J], *Library and Information Service*, 2013(12): 5—7.
- [5] Qian Chen, Wei He and Xiaoyu Sun: The Development Mode of University Library in China in 21st Century[J], *Modern Information*, 2013(12):162—163.
- [6] Junxia Ren, Changbao Jiang and Ying Ji: Study on the Information Service Model of University Libraries in the Network Environment[J], *Library Development*, 2011(10):71—73.
- [7] Ying Jiang: Service Situation and Development Strategies of the Mobile Library Service in China—Comparative Analysis of the Mobile Library Service in China and the USA[J], *Library Development*, 2011 (12):31—34.
- [8] Rong Xie and Wei Liu: SOLOMO and Smart Library[J], *Journal of Academic Libraries*, 2012(3): 5—10.
- [9] Li Han: The Features, Current Status and Prospect of Smart Library under Internet of Things[J], *Journal of modern Information*, 2012(5):48—54.
- [10] Xue Yang: Analysis of the People Based Smart Library Service[J], *A Vast View on Publishing*, 2016(3) : 66—68.
- [11] Shiwei Wang: New Pattern of Future Libraries: The Smart Library[J], *Library Development*, 2011(12): 1—5.
- [12] Xiaotao Li, etc.: On Smart Library and Knowledge Visualization[J], *Information and Documentation Services*, 2014(1): 6—11.
- [13] Shiwei Wang: On Three Main Features of the Smart Library[J], *Journal of Library Science in China*, 2012(11): 22—28.
- [14] Yanbo Li: The Unwisdom in the Research of the Domestic Smart Library[J], *Journal of the National Library of China*, 2014(1): 63—68.
- [15] Guohong Shi and Qianlong Xia: Review and Prospect of Mobile Library Research[J], *Journal of Library Science in China*, 2014(3): 78—91.
- [16] Fangning Zhang: Analysis on the Main Characteristics and Application Mode of Knowledge Service in University Libraries[J], *Journal of the Chinese Society of Education*, 2015(5): 390—391.