Catching Up with Technology: Recent Developments in Chinese Libraries

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The 62nd IFLA Conference in Beijing in August 1996 gave me a wonderful opportunity to enjoy a very fruitful six-week trip to mainland China. While there, I had the privilege of teaching, with a group of colleagues from the United States, three workshops on information technology and the future of libraries at Shanghai University Library, Shanghai Jiaotong University Library and Peking University Library. Besides these workshop hosts, I was also able to visit several other leading Chinese academic and research libraries in Shanghai and Beijing, including Fudan University Library, Shanghai and Shanghai Institute of Scientific and Technical Information, Chinese National Library, Tsinghua University Library, and the Chinese Institute of Scientific and Technology Information. These activities allowed me to observe and to discuss with many Chinese librarians recent library developments in China, particularly in the area of information technology applications and library automation. It is my great pleasure to share with my fellow East Asian librarians what I have learned from the trip on this subject. My discussion will focus on the following areas: bibliographic utilities, automated library systems, application of network technology, and development of electronic resources.

**Bibliographic Utilities**

The benefits brought by bibliographic utilities to a modern library system go far beyond shared cataloging. They are the cornerstone of library automation, and their impact is felt on almost every aspect of library services, including collection development, cataloging, document delivery, and resource sharing. China has talked about cooperative cataloging for many years. The concept of an online cataloging system and MARC format have been taught in Chinese library schools since the late 1970s. Several experiments in establishing a China MARC standard have been made since the late 1980s. However, little was done in implementing the idea of cooperative cataloging for Chinese publications until the 1990s.

Thus, I was very pleased to see two major regional cooperative cataloging initiatives during my visit. One was the Shenlian Online Cataloging Project in Shanghai and the other was the Jinxintu Online Cataloging Center in Beijing. Using the newly-adopted national standard *China MARC format* as their input standard, both initiatives focus on online cataloging of materials in Chinese languages. Headquartered in the library of Shanghai Jiaotong University, Shenlian has more than fifty members--mostly academic libraries--in the Shanghai metropolitan and surrounding areas. Aiming at serving the libraries in Beijing and the surrounding areas, the Jinxintu Center has

*This article is an expanded version of a talk originally given by the author in Chicago on March 12, 1997, as part of a panel during the annual meeting of the Committee on Chinese Materials of the Council on East Asian Libraries.*
worked aggressively to recruit member libraries and to add more bibliographic records to its database. Similar regional effort was also made in Guangdong, the area of China where the most economic growth has taken place since economic reform. These regional initiatives are very encouraging steps that Chinese libraries have taken towards establishing cooperative cataloging utilities for the country. The next few years will be critical for our Chinese colleagues to expedite the growth of the established initiatives, to expand their efforts to cover libraries in less developed regions, and to turn regional initiatives into the establishment of a national utility.

Automated Library Systems

Three different approaches have been taken by Chinese libraries in automating their service functions. These are: home-made systems, acquiring foreign-made systems, and acquiring domestic systems.

1. Home-made systems

The dream of modernizing their libraries by computerized systems is rooted deeply in contemporary Chinese librarianship. Since the late 1970s when Deng Xiaoping came to power and the country began the first steps toward implementing its ambitious plan of the “four modernizations,” library automation was perhaps the most discussed topic in Chinese professional literature of librarianship. Over the years, many attempts to develop computerized programs to automate various functions of library services were made by Chinese libraries, often along with their parent institutions. Though there are plenty of successful stories among these efforts, such as Shanghai Jiao Tong University’s system and Peking University’s system, the home-made approach has some inherent problems. First, the design of such a program or system was often to meet the local needs of a particular library. Several similar activities and developments of this sort might be going on in a given time with little or no coordination among them. As a result, people were not only “reinventing wheels,” but also making products without common standards. These products were neither easily adaptable by other libraries, nor compatible with an open system environment. Another major problem of this approach is upgrading the system. It is common knowledge now that a library needs to upgrade or even replace its automated system every five to seven years. As technology innovations keep bringing new applications to the library world, the demand for system upgrading will remain, if not intensify. This demand requires constant investment of both monetary and human capital from the institutions involved, which could post a great burden on them. Obviously, a home-made system is not a cost effective approach and is hard to maintain in a fast moving technological world.

2. Foreign-made systems

It does not take a genius to figure out that buying, rather than developing in-house, is probably a better way for libraries to get a good system. There are plenty of good library systems available on the market. Many foreign library system vendors are trying hard to open the potentially lucrative market of mainland China. However, for Chinese libraries, buying a foreign-made system was not really a valid option until recent years. The biggest problem was, of course, lack of necessary financial resources. For one thing, all of the foreign-made systems are expensive. The
prices for these systems were prohibitive for almost all Chinese libraries. However, this situation has changed gradually in recent years due largely to the fast growing economy and increasing wealth of the country. To some elite institutions at least, purchasing a foreign made system is no longer an out-of-the-question desire but a viable option. For instance, among the libraries that I visited, three of them chose recently to take this approach to automate their libraries. Tsinghua University purchased for their library in 1996 a U. S. made integrated library system by Innovative Inc. to replace their home-made system. Shanghai Library and Shanghai Institute of Scientific and Technical Information signed a purchase agreement with Ameritech for its latest product, the Horizon system, in November 1995. This system was to be installed in their newly constructed library, an architectural show case and a landmark building in Chinese library history. During the summer of 1996, Peking University Library was evaluating a number of library systems available in the international market. Recent information is that the SIRSI system, also made in U. S., is at the top of their selection list.

Another obstacle preventing Chinese libraries from purchasing a foreign made system was that there were very few good systems available on the market with Chinese character processing capability. For many years, the need for processing non-roman scripts was largely ignored by American and European system vendors. Years ago, Japan was probably the only foreign country which marketed library systems adaptable to the Chinese environment. This situation has also changed in recent years as Asia became an emerging but very important market to library system vendors around the World. Innovative Inc. was the first American company to develop a system capable of handling Chinese characters and among the first to sell their products in Taiwan, Hong Kong, and mainland China. Other companies also sought ways to get their systems modified and enhanced for the Chinese library environment. For instance, Ameritech contracted with Fudan University and Shanghai Jiaotong University to hanhua (“make Chinese”) their Horizon system for the Shanghai Library and Institute of Scientific and Technical Information. The SIRSI company is discussing with Peking University the possibility of a joint effort to localize their system to meet Chinese standards and fit in a Chinese environment. Such cooperation also occurred between Innovative Inc. and Tsinghua University. Although the Innopac System is capable of handling Chinese characters, there is still a lot of room for further improving its adaptability to Chinese environment. Obviously, close cooperation between U. S. system vendors and Chinese libraries in introducing U. S. made systems to China can be mutually beneficial to both parties and will have an impact on Chinese libraries in catching up with technology.

3. Domestic systems

For vast majority of Chinese libraries, however, neither of the above approaches is a valid option. Financial realities simply rule out the possibility either of buying a foreign-made system or making their own, yet their desire for automation is as great as that of their colleagues in elite institutions. To meet this demand, the Chinese government, research institutions, and libraries have launched several projects to develop domestic made systems for different size of libraries. These include the Shenzhen Integrated Library Automation System and the General Integrated Library Automation System that was jointly developed by Xi'an Jiaotong University Library and Zhengzhou University. The Shenzhen Library project was to develop a system for research and large public libraries. As a national priority project that was supported by Chinese government, this project
drew system designing experts and computing professionals from eight major public libraries nationwide. The latter project, the General Integrated Library Automation System, aimed at developing a system for small and medium size libraries. These projects differ from the previous efforts of home-made systems at least in two aspects: they were no longer designed based upon a single library’s needs, and the projects promoted cross-institution collaboration.

The Shenzhen system was a great success and won a number of provincial and national “technological advancement” rewards in China. To make the system marketable to libraries of different size and types, effort was made, after the initial success, to develop a series of the products that are suitable respectively for mainframe and minicomputer, as well as microcomputer operations. Recently, the Shenzhen system was re-engineered based upon client-server architecture for a LAN environment. More importantly, the entire management system has been shifted from a state-fund institutional entity to a commercialized and financially independent corporation. The corporation will include not only a research and development section, but also marketing, sales, and customer service sections. Obviously, this change will give the organization the necessary dynamic and flexibility for growth and for coping with changes brought by technological innovations. By early 1996, the system had been sold to more than three hundred libraries in 26 provinces in China. Undoubtedly, as Chinese libraries strive to automate their services, we will see more and better domestic automation systems available on the Chinese market and a rapid increase in installations of such systems in Chinese libraries in the years to come.

Networking and Internet Application

What impressed me the most during my visit was the enthusiasm that many Chinese librarians and library administrators expressed towards building information network and the application of Internet technology to improve library services. A big difference this time, compared to the similar passion that Chinese librarians had in 1980s for developing bibliographic utilities and library automated systems, was that they were not only talking loudly but also taking quick actions. Some of the institutions that I visited already had campus networks and Internet connections to their libraries. The others were in active planning and implementing phases. Among those who were networked, Tsinghua University Library led the others in applying network technology to improve library services. Using Netscape as the interface, the Library designed a gateway front-end with connections to various integrated local and remote resources. From the interface, one could search the Library’s OPAC database running on a recently-installed Innopac System with full capability of handling Chinese characters, retrieve information from the newly-connected OCLC FirstSearch database and make requests for document delivery, check for campus wide information from web pages mounted by various departments, institutes, units, and branches of the University, or surf the Internet for remote web sites via carefully-selected and well-organized hyperlinks provided by the Library. The system librarians with whom I had the privilege to talk were all very knowledgeable and competent with the new information technology. I was very much impressed with their HTML form-based interface design, which, in my opinion, was as sophisticated and user friendly as any designs that I had seen at the time from American academic libraries of comparable size.
The new Shanghai Library is another showcase of new technology application among Chinese libraries. At the time of my visit, the construction for the new building was not yet completed, but implementation of new technology applications was already being aggressively pursued by the Library. These included 1) installing the newly-purchased Horizon Integrated System, which was engineered for client-server architecture with full Chinese language functionality, 2) developing a CD-ROM database which will contain scanned images of the Library’s special collections, and 3) building a local area network which will provide local and remote access to the Library’s online resources. The new building will be the home for the old Shanghai Municipal Library and the Shanghai Institute of Scientific and Technical Information, an organizational merge that gives the new Shanghai Library not only a new face (the building) but also a new body (the new organization) with mixed functions of the traditional and the new. The new library is the first such merger of a major public library and a scientific information service agency, adding more academic and research focuses to its traditional functions of cultural and public service. The new library will also serve a larger user community with more diversified interests. To meet these challenges, the Library has high expectations of library automation and network technology to help deliver the expected services with improved quality.

One major problem that I observed in the area of networking and Internet application in China was insufficient technological infrastructure, which hindered the growth of library networks and prevented libraries from taking full advantage of Internet applications. In some libraries that I visited, the off-campus network connection was incredibly slow, though the on-campus connection ran at a reasonable speed. Apparently the bottleneck in information transmission was the routers connecting the campus network to the outside world. Although in recent years the Chinese government has invested heavily in building network backbones such as China Education and Research Network (CERNET) and Chinese Academy of Science Network (CASNET), more effort must be devoted to greatly expanding the capacity of established network backbones and enhancing network structures at the city level. I was told by a friend who recently visited China that the speed of Internet connection has greatly improved on those campuses since last summer. However, as the number of Chinese academic institutions joining the Internet and the usage of existing networks keep increasing, meeting the ever-growing demand for network structure expansion will remain an issue for China for at least the next few years, especially for less developed regions.

Electronic Resources

Compared to libraries in the United States, collecting electronic resources is by no means as common yet in Chinese libraries. However, most libraries that I visited did have an electronic resource or multi-media reading room. The basic, if not entire, resources available in those rooms were in CD-ROM format. Most of these facilities provided equipment with Internet connections and web browsers. Thus, “net surfing” for web sites was readily available despite the problem of transmission speed in some libraries. However, for most libraries, subscription and access to commercialized online resources was still a relatively remote concept rather than a daily practice. Among the CD-ROMs collected, imported bibliographical databases account for a large proportion, while domestic CD-ROM products have increased rapidly in recent years.
The electronic reading room in the National Library has a CD-ROM local area network (LAN) with a sizable collection of databases, which included products from most, if not all, major U. S. CD-ROM vendors, such as SilverPlatter, UMI, IAC and EBSCO. The reading room provides fee-based service and has become one of the most used facilities of the Library. Tsinghua University Library's multi-media center has collected a good number of Chinese CD-ROMs including multimedia and full text products. Coverage ranges from electronic dictionaries, bibliographies, and selected art collections to travel guides, Peking opera and cook books. The Library also served as the training and promoting center for OCLC FirstSearch in China, introducing subscription to online access and document delivery services to Chinese libraries.

I was impressed with the spirit of entrepreneurship displayed by some Chinese library administrators in the course of modernizing their libraries. The cooperation between Tsinghua University Library and the OCLC Asian Division in introducing FirstSearch to Chinese libraries was only one example. This partnership with OCLC brought the Library not only a substantial discount on FirstSearch, but also additional financial support from the University administration and some outside sources to equip the Library with a large number of state-of-the-art computers and networking facilities. Shanghai Jiaotong University Library's Tulip Multi-media Center was another good example. The Center is a "joint venture" of the Library with Tulip Computer Company in Holland. The Company provided the Center 25 Tulip multi-media workstations, and for its part the Center agreed to serve as a training center for the Company's products--hardware and software--in the Shanghai metropolitan area. This cooperation gave Shanghai Jiaotong University Library a major portion of a much needed initial investment for establishing a multi-media center in the Library. At a time when libraries budgets are very tight and the pressure for automation great, this kind of entrepreneurship, creativity, and flexibility of library leadership is certainly much needed and appreciated by Chinese libraries.

Electronic publishing has just started to pick up momentum in China. China has a written history of five thousand years. The earliest documents in Chinese extant today--inscriptions on bones or tortoise shells--can be traced back more than three thousand years. China has one of the longest and largest accumulations of written records of human civilization in the world. China also ranks No. 1 today in the world in total number of annual publications, with 101,381 monographic titles and 7,583 periodical titles published in 1996. The rich cultural heritage of written documents and a dynamic contemporary publishing industry give the country great potential in the emerging market of electronic publishing and digitization. Several sectors in the Chinese society--government, industry, and book vendors--are well aware of this great opportunity and have started investing in the new adventure of electronic publishing. Academic institutions and libraries also play an important role in this endeavor. For instance, the National Library is producing the CD-ROM edition of Chinese National Bibliography (1988 to date) and Chinese National Bibliography 1949-1987, a retrospective database in CD-ROM format. Shanghai Library is putting its publication Index to Chinese Newspaper and Periodical Literature (Quanguo baokan suoyin) on CD-ROM. Tsinghua University formed a national research center for CD-ROM products, consisting of faculty and graduate students from its departments of physics, computer science, electronic engineering and others, to produce a full text database of 3,000 academic periodicals in Chinese and English languages (published in China) in CD-ROM. The database, divided into eight subject clusters, will be published monthly. Staff from Tsinghua University
Library involved in designing and fine-tuning the database’s retrieval system. Another example of this kind is the CD-ROM version of *Reprinted Newspaper and Periodical Literature (Fuyin baokan ziliao)*, a full-text database of selected Chinese newspaper and journal articles, which is produced by the People’s University in Beijing. Peking University Library initialized a national project to create a full text database of periodical literature in social sciences and humanities, and the project has received support from the State Commission of Education. Like that launched by Tsinghua University, this project also has a very ambitious objective.

The development of electronic publishing in China will undoubtedly change the landscape of Chinese publishing industry. As a East Asian librarian, I am encouraged to see that China has made great efforts in using new technology to improve the accessibility of its academic publications and research resources, which is certainly welcome news to our patrons in Chinese studies. At the same time, I am anxious to see what the implications of such developments may be on our work. I believe that the rapid growth of electronic publishing in China is likely to have an impact on East Asian collections in North America in the areas of collection development, collection management, and reference services in near future.

**Difficulties and Problems**

Up to this point, I have focused on the positive developments that I observed in Chinese libraries. There are, of course, problems and difficulties facing Chinese librarians. The most frequent complaint that I heard, not surprisingly, was insufficient budget. Although the country has managed to sustain a double digit growth in its economy for the past decade, inflation has also been high. Book prices have been escalating at a rate higher than the general inflation rate. According to one report, the average book price increased more than 800 percent between 1983 and 1993. Such increases have continued at a similar rate to date. As a result, the increase of book budgets in most libraries can hardly meet the escalating book prices. To make the matter worse, the annual book production in China increased about 370 percent from 1980 to 1995, leaving Chinese libraries with a constant decline proportionally in acquisition of available publications.

The pressure to find money to buy more books certainly has had a negative impact on libraries’ ability to implement automation. Understandably, except for perhaps a small number of elite institutions, Chinese library administrators often find it a formidable task to get the initial investment for an automated system, and even more so in the case of upgrading an obsolete system. Many Chinese libraries still reside in very old buildings with inadequate space for ever-growing collections and deteriorating working conditions for staff. For those libraries, even if the money becomes available, it is perhaps a higher priority to build a new building or an extension of the old building than to purchase an automated system for the Library.

Recruiting and retaining high quality librarians is another challenge that Chinese libraries have to face these days. Modern librarianship demands professionals with solid training, proficiency in English or other foreign languages, and computer skills. These are also the qualifications sought by many foreign joint venture companies and government agencies. The companies often offer much higher salaries while many government agencies offer generous bonuses and benefits and/or
more attractive career ladders. In an environment where the traditional value of institutional and professional loyalty is challenged by the value of individual's economic well-being, libraries have to compete very hard to get and keep quality employees. Many libraries have tried various "innovative" ways to bring in revenue to better compensate their staff. However, unless the social and economic status of librarians in China improve significantly, losing able employees will remain a problem for Chinese libraries.

As Chinese libraries move toward a networked environment, they will have to endure tremendous changes—changes that go beyond catching up with technology, and changes that challenge some of the traditions rooted deeply in Chinese librarianship and society. In the tradition of Chinese librarianship, ownership was emphasized over resource sharing, protection of collections was emphasized over convenience of access, and institutional affiliation was emphasized over open access to all. Obviously, in the course of modernizing their libraries with new technology, Chinese librarians must also "modernize" the old values with new concepts and philosophy. Among these new concepts, resource sharing and institutional cooperation are the most critical. Chinese society has a strong sense of institutional affiliation and self-reliance. Borders between institutions are clear, and walls separating them are thick and strong. Cooperation and resource sharing, even among the same type of libraries, have never been strong in China. Given this background, nurturing and promoting a commonly shared value for institutional cooperation and resource sharing becomes more critical than ever before to Chinese libraries. Unless the concept of resource sharing is fully embraced by Chinese librarians and administrators, the road leading toward building library networks will likely be bumpy. Even if such networks were physically in place, libraries might still not be able to take full advantage of them.

Conclusions

There is no doubt in my mind that Chinese libraries are going through a very important period of modernization. The enthusiasm among Chinese librarians for automating their libraries and building library networks is great and the desire to learn and implement new technology is tremendous. Chinese libraries are pushing forward on several fronts of technological applications and are making impressive progress. However, a massive implementation of library automation with network technology in the country has not quite come yet. The development is uneven with wide gaps between elite and other institutions, developed and developing regions of the country, and between major metropolitan areas and other cities. Nevertheless, the librarians from many different regions and institutions with whom I had the privilege of talking, especially those who attended our workshops, seemed all to share a common vision that technology is the way to go for the future of Chinese libraries.

NOTES

2. Ibid.

