

Electronic journal provision and use in China: an initial study



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The growth of electronic journals (e-journals) in Western Europe and North America has been widely reported. The rapid development of e-journal publishing in China is less well known. This paper provides a brief introduction to the development of e-journals in China before examining their impact on libraries, particularly academic libraries. Several factors that may have affected the growth of e-journals are noted, including the nature of government initiatives and pedagogical methods. As well as pointing to and reviewing some of the limited literature on the development of the publishing industry, the researchers also conducted some interviews in China. To provide an initial understanding of the impact on libraries, a small survey of academic libraries was undertaken. In addition, a study of the perspectives of the academic and library staff of Shandong University, one of China's largest universities, identified specific effects on user behaviour, the library staff and the budget.

Introduction

Chinese research output has increased dramatically, and statistics from the Institute of Science and Technology Information of China (ISTIC) indicate that in 2006 China overtook Japan and the United Kingdom to become the world's second largest producer of scientific research papers indexed by the Institute for Scientific Information (ISI).¹ Papers published in English and indexed by ISI represent only a fraction of Chinese research output, but until recently material written in English to explain the publishing scene in China² has been relatively scarce. Papers about Chinese journal publishing have tended to focus on issues of quality control in Chinese language journals, the consequences for the global impact of Chinese science, and the need

to stimulate more publishing in the English language.^{3,4} Moreover, there appear to be relatively few research papers about electronic publishing in China.

Although the trends within the journal publishing industry are becoming apparent, and are briefly reviewed here, the impact on libraries and their users in China is an aspect of these developments that has not been the subject of much research. With the introduction of electronic journals (e-journals), Chinese libraries' previous management paradigm based on printed journals has been challenged, and the impact on public and particularly academic libraries in collection development and the costs associated with staff,

equipment, space and the patterns of user behaviour need to be studied in detail. This paper therefore presents a preliminary attempt to examine those topics.

Development of electronic publishing in China

With the increasingly widespread availability of the Internet, e-journals have become a common resource in China's libraries. Whilst there has recently been a growing interest in journal publishing in China, literature on the development of electronic publishing there appears limited, or at least difficult to identify and access, as much is available only in the Chinese language. Many indexes to the Chinese literature do not yet have electronic editions, making searching for alternative sources more difficult and time-consuming. This paper therefore begins by reviewing some of the key developments in the publishing industry in China that are reported in some of the more substantial Chinese sources identified to date as well as those in English.

Zheng provided an overview of the publishing industry in China in 2004.⁵ In 2005, Dong analysed ten years' development of electronic journal research in China, summarising theoretical research, applied research and practical applications.⁶ In 2006, Jia reviewed the growth of journal publishing in China.⁷ *Publishing Today*, a magazine launched in Beijing in 2005 by a group of Chinese publishers and distributors, also includes some reports about the Chinese electronic publishers. In 2006, the Ministry of Science and Technology published a policy review of scientific publishing, from which much data can be drawn.⁸ The website of General Administration of Press and Publication of People's Republic of China (GAPP) also offers a way of understanding the Chinese publishing industry.⁹

Because of the different pattern of growth in the introduction of information and communication technologies (ICT), e-journal publishing emerged in China much later than it is reported to have done in Western Europe and North America.¹⁰ Another important factor may have been the education system. In many western countries, students are expected to read widely, using journals to acquire necessary information, whereas the Chinese education system still depends heavily on the use of textbooks.¹¹ There are also differences in the government policies applied to the publishing industry.¹²

However, Zheng notes that, following the Chinese economic reform in the late 1970s, China's publishing industry has developed rapidly.¹³ There were only 105 publishing houses in China in 1979 but, by 2000, there were already 562. In 2001, China had 8,889 registered periodicals, of which some 7,000 were said to be academic journals.¹⁴ Jia claimed that there were 4,876 scientific and technical journals published in China in 2003.¹⁵ However, a Ministry of Science and Technology study reported that in 2005 there were 5,387 STM journals in China, of which 3,685 were academic/scholarly journals, 1,090 technological, and 235 popular science, while 214 dealt with general policy, and 163 were indexing/abstracting journals.¹⁶ Definitions used by these authors and the sources to which they attributed their data may vary, making it difficult to obtain a clear picture. However, it is clear that growth has been substantial, and behind such growth lies the familiar pressure for academics to publish to secure promotion^{17,18}, although particular incentives were being offered to academics whose research papers were published in highly ranked international journals.¹⁹

Most of the scholarly works in China are published by over 100 university presses. All the publishers are under the control of the government agency GAPP. Although all the major policy decisions should be taken by GAPP, every publisher controls its own management and finances. They assume sole responsibility for their profits or losses. In 2001, GAPP made recommendations for changes in the arrangements for running university journals. In 2002, the Ministry of Education then gave its views on the improvement of university journals of philosophy and social science.²⁰

China started research into CD-ROM technology in the late 1970s and produced its first optical recording and reading system in 1985. Wenbo noted that the earlier CD-ROM publications were e-journals, patent and law databases.²¹ Today, China's publishers still use CD-ROM technology widely to produce or reproduce full text and searchable products, among them the Chinese Newspaper and Periodical Index Database (CNPID), which was initiated by the Shanghai Library.

The Internet was introduced into China in 1987. Initially, its limited availability caused many people to have a negative feeling for e-journals. Zheng has noted that: "due to barriers of various kinds, the Internet was not so popular as today."²²

Nonetheless, the arrival of the Internet opened the wider market for electronic publishing. In 1991, Professor Chen Guangzuo at Wuhan University created the first Internet publication, *The History of the relationship between the Kuomintang and the Chinese Communist Party*. The first Chinese-language electronic journal in the world, *Hua Xia Wen Zhai*²³, was published in 1994, and the first electronic journal to be published in the People's Republic of China, *Shenzhou Xueren*²⁴, appeared in January 1995. During the next few years significant developments began to be seen, and Wenbo reported that: "In 1998 there were more than 300 Chinese electronic newspapers and periodicals transmitted by Internet in China."²⁵

By December 2006, the Internet had reached 137 million users in China, about 11% of the population, with about two-thirds of them using broadband.²⁶ After advanced computer technology began to spread into China, Chinese professionals and the government started to realize its importance. There are now many electronic publishers in China, mainly the printed journal publishers providing digital editions of existing journals. With the strong support of the Chinese government, the development of e-journals in China has been rapid. Before 2001, most e-journals in China depended on CD-ROM systems. By 2003, two-thirds of the existing scholarly journals had been digitized.²⁷ Today, over 3,000 journals in China have online editions.²⁸ Few Chinese journals have adopted an open access online model²⁹, although a number of state-owned publishing houses, particularly small universities publishing low ranked journals, had already experimented with or adopted the 'author pays' model to supplement revenue at a time of budget cuts, and a number of digital repositories have been established.³⁰

Finding information is seen as increasingly important, particularly as most university journals are very broad in their scope.³¹ Fan reported: "The worldwide web is increasingly used in conjunction with research, to share information, and to publicize projects and organizations. At the same time, the ability to sift through the ever-increasing amounts of information made available online to find reliable and accurate data is becoming more important every day."³²

The six principal databases for Chinese academic articles and papers are: China National Knowledge

Infrastructure (CNKI), Wanfang Data³³, The National Science and Technology Library (NSTL), The Chinese Social Sciences Citation Index³⁴, Index to Chinese Periodical Literature (PerioPath)³⁵, and Gateway Service Centre of Chinese Academic Journal. However, some of them are not available outside China. Others include China Academic Journals Database³⁶ and the Chinese Scientific Journals Full Text Database³⁷, both available in English.³⁸

Over the last ten years, a major reform has taken place in the Chinese publishing industry in response to the sharply increasing competition and globalization, and the merging of publishers in developed countries. Since 2002, in order to adapt to this changing environment and increase Chinese publishers' ability to respond to the challenge of joining the World Trade Organization, more preferential policies have been introduced. For example, after approval by the government, publishing groups could do business across all sectors: newspapers, periodicals, books, audio products and online publication. After the Chinese economic reform, the aim of all the Chinese publishers is profitability or at least to be self-financing. This is recognized by the Chinese government as a necessary change if the Chinese publishing industry is to be well developed. Wang and Weldon note that any government subsidies for journals do not cover their entire costs, and Chinese authors (or their institutions) are widely expected to pay page fees to see their papers produced.³⁹ Besides the journals developed by Chinese publishers, major international publishers have started to set up offices in several cities, and are also beginning to produce some Chinese versions of their existing electronic journals or establish new journals with Chinese content.^{40,41}

Just as western publishing companies have merged to broaden their range of electronic publications and improve the return on their investment in digitization, Chinese electronic publishers are also merging, with government support, to form larger publishing groups, partly through universities merging to form larger institutions. In addition, the Ministry of Education is encouraging universities to co-operate to produce better journals.⁴² Although the reasons for the consolidation of the publishing industry may be somewhat different, the direction appears similar.

Electronic journals in Chinese public libraries

Alongside the modernization of the journal publishing industry, efforts were also being made to introduce computer applications into libraries, initially through implementing library management systems, access to DIALOG, and purchases of databases on CD-ROM.

Chan, who purchases journals on behalf of the Capital Library in Beijing, commented in an interview with one of the authors in 2005 that most people in China have not yet entirely accepted electronic journals. This could still be observed from the rate of use of the online journals and databases in the public library. Chan said few people go to the public library to read digital publications. There had also, initially, been a problem with the acceptance of e-journals by libraries in China, especially public libraries. After the emergence of e-journals, some Chinese libraries had considered not buying the printed journals. However, there were so many problems, such as the continuity of journals and people's reading habits, that they had had to abandon their original plan. Subsequently, with the rapid development of e-journals and changing reading habits, they had now become the most popular product in digital publications. Libraries set aside more and more funds for e-journals. In addition, in the Quality Standards for Chinese Libraries, the range of e-journals is a significant factor. However, Chan believed that the possibility of e-journals becoming the majority of purchases for public libraries was very small.

During the interview with Chan, some reasons why Chinese public libraries are now purchasing both printed and digital journal at the same time were outlined. First of all, he claimed, most people still feel that reading printed journals is more comfortable and convenient. Secondly, readers have yet to develop the necessary searching skills, although some public libraries have been offering training for the public in using the Internet and database searching.⁴³ Thirdly, whilst electronic journals offer advantages to the libraries such as the saving on storage costs, people must pay extra fees for reading e-journals in Chinese public libraries to alleviate some of the financial burden on the libraries of buying e-journals.

However, he also pointed out that while academic online journal databases are very popular among professors and teachers, students might not

regularly use them in higher education. The traditional Chinese education system based on textbooks and examinations puts students under no pressure to read additional, related materials.

Electronic journal development in Chinese academic libraries

The impact of electronic journals on academic libraries has, however, been evident in China since the 1990s. The benefits offered by electronic media were as widely recognized in China as elsewhere, and the shift to e-journals in academic libraries, which have been substantial, forms the focus of the rest of this paper.

In 1999, a strategic plan was made for the academic libraries in China to migrate from the traditional print journal collections to electronic journals. This was underpinned by the establishment, in 1994, of the China Education and Research Network (CERNET), one of four high speed national networks.⁴⁴ Since the end of 1998, with national funding, Tsinghua University and Beijing University have developed two main electronic information systems. One is the China National Knowledge Infrastructure (CNKI), which covers over 80% of Chinese resources, including the China Periodical Full Text Database. Another is the China Academic Library and Information System (CALIS).⁴⁵ The mission of CALIS is to promote, maintain and improve library resource sharing among the universities.⁴⁶ It maintains a Union Catalogue Database, the Chinese Daily Periodical Table of Contents, and links to many foreign language databases, including those produced in English, Japanese, Russian, etc. From 1999-2004, access to electronic journals increased 15%-20% every year in China.⁴⁷ By the end of 2004, CALIS offered 120,104 issues of Chinese serials.⁴⁸ Furthermore, the CNKI Digital Library reported that it holds more than 16 million Chinese full-text articles. By December 2005, over 600 academic libraries were able to benefit from CALIS.⁴⁹ As a nationwide academic library consortium, CALIS and CNKI are expected to build the China Academic Digital Library (CADL), creating and extending access to digital resources to all the 1,100-1,500 Chinese universities and colleges. These information systems are distributed through eight main centres connected to all the other national universities in China. This is the so-called

'three-levels information provider system', and has been successfully implemented for all of the universities in China.

The Chinese government also implemented the '211' project for higher education at the beginning of the 9th Five-Year Plan. The implementation of project '211,' which aims to build 100 key universities in the 21st Century, is intended to train high-level professional staff. It is one of several elements in the national strategy for social and economic development through science and education.⁵⁰

Research method

The rapid transition from print to electronic journal collections posed both challenges and opportunities, but there is an absence of literature on the impact of electronic journals on the academic libraries in China.⁵¹ It was therefore considered important and useful to undertake some survey research to review the provision and use of electronic journals in Chinese academic libraries.

To provide evidence about academic library services, quantitative data on electronic journal services in China were gathered by a questionnaire survey of selected academic libraries. The survey took place in mid-June 2005, using questionnaires distributed and returned as e-mail attachments. Out of 58 academic libraries surveyed, 37 responses were returned, which is a response rate of 63%.

To supplement this broad study, this paper also presents the Library of Shandong University as a case-study of how these key issues are affecting library management in China. Shandong University Library⁵² is the largest academic library in Shandong province and the largest in the east of the China. The Library is one of the eight centres for the national information system, connecting to the universities in the North East area of China, and is one of the first group of '211' project universities that has completed the transition from print to electronic journal collections. Data was collected and analysed from the library of Shandong University Annual Reports (2000-2004), which provided evidence of the continuous changes in e-resources and their impact. By the year 2004, the journals collection consisted of 726 print subscriptions, 14,430 full text electronic journals, and more than 180 electronic databases.

The main library of Shandong University and three of the University's subject libraries (law,

medicine and engineering) were selected for deeper investigation, and interviews were carried out during August 2005. The electronic journal provision in the main library is currently at a higher level of development than in the subject libraries, having been the recipient of larger funding over the last few years. The engineering library and the medical library are presently at a more advanced stage of development than the law library.

Quantitative data was also gathered from a sample of library and academic staff at Shandong University to discover their opinions on the transition from print to electronic journals. The survey of a simple random sample of the library staff from the main library and the three subject libraries was carried out in mid-August 2005 using questionnaires designed to be distributed and returned as e-mail attachments. Out of 63 staff overall, there were 31 questionnaires returned, which is a response rate of 49.2%, slight lower than anticipated. Seven responses were from the main library, 13 from the engineering library, six from the medical library, and five from the law library. To gather supplementary qualitative evidence, interviews were also conducted with a purposive sample of 19 staff, including the heads of the three subject libraries. Every effort was made to find staff who had worked in the library for over five years (the average term of service was in fact 13 years), and who spend most of their time in the periodical department dealing with users. Out of 19 interviewees, nine were library assistants, two were senior support assistants, five were senior library assistants, and the other three were the heads of the subject libraries.

A small survey was also conducted amongst Shandong University Library users in each of the selected libraries at the end of the July 2005, using a questionnaire containing mostly closed questions. Users in each library were surveyed on separate, one-day visits. Overall, 110 users were surveyed, thirty in each library except the law library, where only 20 users participated in the surveys.

E-journal provision in Chinese university libraries

The 2004 Annual Report of Shandong University Library reveals a marked decline in the acquisition of print journals between 1999 and 2004, and an

increase in e-journal subscriptions. It appears that the pattern of an overall decline in subscriptions began to be reversed by 2003. A significant increase in 2004 is due to two universities merging together as one (see Table 1).

The pattern of growth continues, and according to a more recent survey (August 2005), there were around 10,000 foreign language electronic journals and about 7,000 electronic journals in Chinese available in the Library.

Nationally, 76% of the respondents to the survey of academic libraries preferred them to acquire e-journals. Of the respondents, 21% intended to cancel all print journals, while 10% wanted to keep only print journals, with the rest wanting to retain both formats.

Impact on Chinese universities' library users

Overall, use of electronic journals accounts for less than 4% of the Internet traffic in China.⁵³ However, it was obvious that the transition to electronic media had impacted greatly on the Shandong University faculty. Of all users responding to the survey, 66% tended to use scientific journals, 20% social sciences, and 14% humanities. Furthermore, the users of scientific e-journals came predominantly from engineering and technology (51%) and medical sciences (21%). The survey revealed that 79% of the academic respondents wished to use e-journals, and only 8% did not wish to use them. However, only 29% of the faculty members wanted to cancel print journals, while 64% wanted to keep both print and electronic journals, and 7% wanted to keep print journals only. Use of e-journals varied between subjects.

The results from user surveys indicate that, in Shandong University, almost all library users use the e-journals. Table 2 shows the frequency of e-journal use by the faculty in Shandong University.

Shandong University faculty members and other professional workers in the departments such as mathematics, natural sciences, engineering and medical fields have been early adopters of e-journals and other digital library resources. This survey showed that those who work in areas of science and engineering use e-journals most frequently. Academics from social sciences and humanities were transferring more slowly to using electronic resources. Less than 7% of the respondents indicated they had never used e-journals in the past three years. When asked why they did not use e-journals, the answers indicated that there were few e-journals in their related areas.

Traditional Chinese culture values visible, tangible resources over electronic tools and information.⁵⁴ Nonetheless, e-journals have had a great impact on the information-seeking behaviour of academic and research staff in universities. The potential for simultaneous access to the same journal by several users was not a new phenomenon. In the period after the 'cultural revolution,' "there was huge demand for education at all levels – and an equally huge demand for all of the resources and infrastructure a sound education system requires. Libraries too were scarce on funding, and this led to a significant amount of print piracy occurring across the nation. To meet the demand for research, libraries would purchase one copy of a journal, and have several copied versions available for public use."⁵⁵

Year	1999	2000	2001	2002	2003	2004
Printed journals	13,068	8,712	4,356	2,178	1,452	726
Electronic journals	147	369	923	2,308	5,772	14,430

Table 1. Changes in the pattern of subscriptions at Shandong University Library

Frequency	Number of faculty (n=110)	Percentage (%)	Predominant subject interest
Daily	41	37.5	science; engineering and technology
Weekly	38	34.2	science; engineering and technology; social science
Monthly	19	17.7	social science; humanities
Yearly	5	3.7	social science; humanities
Do not use	7	6.6	the Chinese ancient literature; history

Table 2. Frequency of e-journal use in Shandong University libraries

However, the shift to electronic resources has brought its own problems. Fan noted that: "Most scholars, researchers, and students obtain academic information from Internet resources every day to further their own research. Fairly quickly they understand that rigorous standards of academic scholarship cannot be satisfied by a simple Yahoo search: the vast quantity of undifferentiated material such a search yields must frustrate those longing for truth." ⁵⁶

Understanding information-seeking behaviour in using electronic journals is now a major concern for libraries providing e-journal services. Respondents to the user survey gave opinions on their recent experiences and future expectations for e-journal searching in the Shandong University Library in both the past and future. The most significant value of e-journals that they identified is the users' ability to search them. Many users are introduced to e-journals primarily via searching the contents of the catalogue. When they search for information online, they need support from library staff. Their expectation was that the library staff would have the knowledge required to support them, to resolve access problems, and to provide on-demand and customized training. The users expected the library service to provide fast, reliable and free online access and printouts, and off-campus access.

When users were asked for the conditions that they regarded as indispensable for their future needs for teaching and research, the answers were ranked as follows:

1. High speed
2. Rich in content
3. Convenient to access
4. Low cost to the user
5. Stable.

The survey in Shandong University showed that several methods are used to obtain available e-journal information: 34% of the respondents tend to use the library to get access to the e-journal resources; 30% read articles from a library web page but from their office, laboratory or home; 58% of users had the facilities to permit potential use from home, and it seems likely that off-campus access will increase and in due course outpace the in-library access.

Multilingual provision is one of the typical features in the e-journals collection of the Chinese academic libraries. Only during the last three years

have Chinese language e-journals approached being half of the total collection. English-language journals still accounted 43% of the collection, whilst 6% were in other languages. Some seldom-used e-journals in foreign languages are included in e-journal collections. Shandong University Library indicated that these were inescapable parts of 'big deals.' Both Chinese and English electronic journals enjoy a high rate of usage in Shandong University. Chinese-language e-journals were the most heavily consulted; other languages were used less. Nationally, the survey showed that Chinese e-journals appear to account for 95% of the total usage.

The impact on students was not assessed a part of this study. However, it seems likely that the potential of e-journal publishing in Chinese to change pedagogical practices radically has not yet been realized. Students generally still have to memorize all the key points that have been listed in the textbook to pass the exams. This situation can be found not only in Chinese middle schools and high schools, but also in some of university undergraduate-level courses. Under this style of education system, students could easily pass the exams without searching online databases and reading related journals, and perhaps without developing the critical thinking skills which once might not have been welcomed by an authoritarian regime but which might become more acceptable as China modernizes its society and economy.

Impact on Chinese universities' library staff

Staff workload patterns everywhere in China have changed with the transition to e-journal collections. New tasks have been created and some others have been realigned. The survey of academic libraries showed the redistribution of the library workload had given rise to a new category of employee. This type of employee is skilled in managing modern digital libraries and computerized systems. New positions have been created to support the use of e-journals. The main areas of increased workload were:

- development of OPAC system
- public access to Internet and developing library web pages
- acquiring and networking CD-ROMs

- extending range of online databases or making these more widely available
- electronic document delivery systems
- developing systems for filtering information
- expanding or introducing e-journals services
- electronic inter-library loan system.

Although the workload has increased because of the computer-based activities related to electronic resources in libraries, some of the traditional work has been reduced and the associated positions cancelled, for example:

• storage space management	> staff reduced
• stack maintenance	> staff reduced
• article file maintenance	> staff reduced
• article checkout	> staff reduced
• journal binding	> position redundant
• re-shelving	> position redundant
• user photocopying	> position redundant

Table 3: Impact of e-journals on library staff in Chinese university libraries

It is becoming clear that the new approach to library service needs not only e-resources but also professional staff: "We now lack high level professional librarians; most library staff aren't confident with their tasks, they can't provide useful services for users, but only do some original information copy and some simple tasks." ⁵⁷

The academic libraries survey asked respondents to explain the pressures on staff that had arisen in the rapid change to an electronic environment.

Reasons for pressure	Respondents giving this reason
Internet use	28 (75.7%)
Skills in computer use	17 (50.1%)
Knowledge about professional e-journal services	16 (43.2%)
Responding to users' higher expectations or skills	7 (18.9%)
Competition for the job	5 (13.5%)
Language problem	2 (5.4%)

Table 4. Transition to e-journals and pressure on Chinese universities' library staff

This is borne out by the comments of staff at Shandong University Library:

"I feel it is difficult to catch up with changed situation. I've often felt nervous. I would say I'm perhaps not as confident as the others." (Library Assistant, Shandong University)

"Providing good services with electronic journals really demands staff who have good Internet and computer skills and good language skills." (Senior Librarian, Shandong University)

It seems that it is recognized that the pressures would be reduced if the staff could be trained. The 2004 Annual Report of Shandong University Library showed that over 79% of the library staff had received some training in the past three years. That training programme could be the way to resolve the problems is supported by the staff survey in Shandong University Library. The Head of the University's subject library said:

"...all of our staff have been trained (or are undergoing training) to basic Internet, computer use and web page use, which has given them much more confidence in searching the Internet on behalf of users and helping them to use it themselves."

However, some comments indicated that certain staff do not feel the need for any training for their jobs:

"I think I don't need any training in Internet and computers, I have been working on ancient books and rare editions for several years and there is no Internet and computers in this section..." (Senior Library Assistant, Shandong University)

When asked what type of training they had received, 31 of the 63 surveyed library staff responded, in some cases with more than one answer.

In the past three years, what type of training you have had?	Responses
Training for use of computers	27 (87.0%)
Training for use of Internet	23 (74.1%)
Training in basic web page technology	20 (64.5%)
Training in retrieval skills for various databases	10 (32.3%)
Attendance at library professional meetings	2 (6.5%)

Table 5. Training received by Shandong University Library staff

However, the staff surveyed indicated that not every one could get the proper training:

"I worked at the section of circulation services for print journals. I hoped I could get training, but in this section there is less opportunity to get training." (Library Assistant, Shandong University)

The recent introduction of e-journals means that library work is much more complex now, with more time and effort required to manage journal services efficiently. The surveys showed that the most widely acknowledged reason for the increased pressure on staff was supporting use of ICT, for which most library staff lacked skills. The staff interviewed at Shandong University Library indicated that they lacked confidence to manage these tasks and to deal with enquiries from users who had high expectations of the electronic resources. Most of them felt they knew little about the Internet and computers. Another problem was the increased workload. The library staff felt much busier than they ever were before the transition. The interview comments also revealed that a minority of library staff were worried about their future employment.

Total staffing costs are higher in an electronic environment than in a print journal environment. The management of Shandong University acknowledged that it lacks professional staff with the ability to manage e-resources. Training for the library staff has become an important item in the allocation of library budget. Training expenditure has been increased to 13% of the annual budget between 1999 and 2004.

Impact on the library budget

The fact that increases in the library budget have been necessitated by the transition to e-journals is generally accepted. In the academic libraries surveyed, there had been a tremendous increase in budget allocations for e-journals. In the academic library survey, 75% of the responding libraries had observed increases in budget allocations attributable to the new electronic facilities and services. The survey respondents were asked for their opinions as to the possible reasons for the budget changes in their authority (Figure 1).

The interviews at Shandong University Library confirmed that the ongoing shift from print to online resources was the major cause. However, when the Library compared their journal purchase records between 1999 and 2004, the evidence showed there was no difference in expenditure on purchasing electronic and paper journals (Figure 2).

At Shandong University Library the cost of purchasing the e-journals themselves had not really affected the overall budget plan; expenditure appears to have been contained. The factors that really have affected the budget are the management costs, the costs of restructuring and retraining the

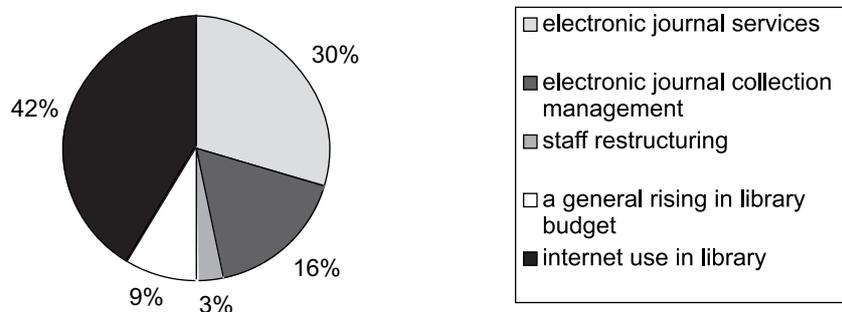


Figure 1. Reasons for budget changes in Chinese university libraries

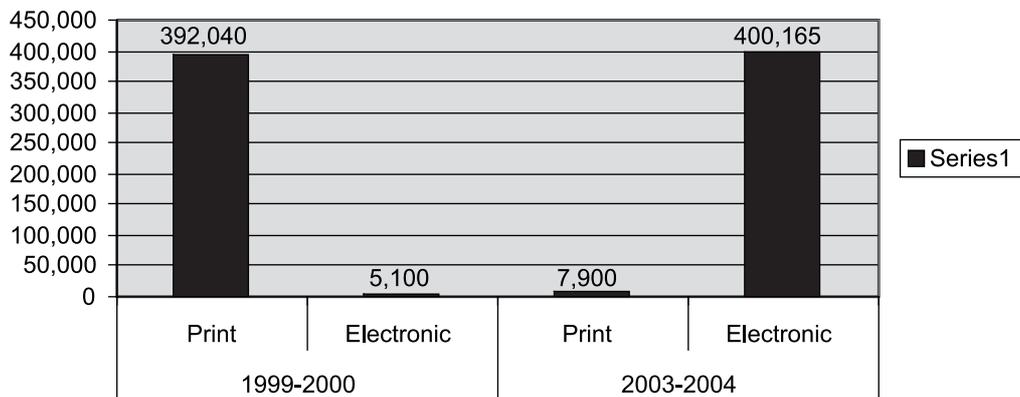


Figure 2. Journal purchases at Shandong University Library, 1999 and 2004 (Note: Expenditure in RMB)

library staff, and the costs of library systems hardware and software purchases and maintenance.

In 2005, the Chinese government's educational priorities shifted from the universities to the improvement of education in the rural areas. Most universities' budgets have been reduced, and consequently so have their libraries' budgets.⁵⁸ The impact on China's journal publishers is not yet clear.

Conclusions

The Chinese government is not only encouraging the growth of its electronic journal publishing industry, but also facilitating access to its products, particularly in the universities. The introduction of e-journals has accelerated the digitization and modernization of academic libraries in China. However, Chinese academic libraries show a different pattern in the distribution of their budgets from that experienced in most western countries. There is no evidence of allocations shifting to support the purchase of e-journals, but increased budgets have had to be allocated for equipment and staff costs.

The development of e-journals in China has only just begun, and the pace of change has been rapid, but the overall picture that emerges is otherwise broadly similar to the experience in Western countries. Although this study has revealed some of the impact of the transition to e-journals, the research was necessarily limited by circumstances and the resources available to the researchers, and further investigation is needed to understand more fully the implications for libraries' staff and users. Understanding and managing the impact of the transition from print to electronic journal collections in China are important and necessary topics for further investigation.

This paper is based largely on research completed in 2005/6 which was undertaken by Hong Wang (then a member of staff of Shandong University Library) for the award of her Masters Degree in Information and Library Studies at the Robert Gordon University, supplemented by material gathered by Fei Nie for her Masters Degree in Publishing Studies. Their dissertations have been edited and updated from more recent literature by their dissertation supervisor.

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