

# Analysis and discussion on electronic resource construction and information service of libraries in Mainland China

GUI Jun YANG Yi ZHOU Di

*CALIS Center in Engineering Technology, Tsinghua University Library,  
Tsinghua University, Beijing 100084, China*

## Abstract

After ten year's development, the electronic resources now become the kernel part of the library resource, and they also are the important foundation of information service of university libraries of Chinese Mainland. Consortium purchase is the main mechanism to introduce electronic resource in this development process. In this paper, the statistical data of these four main kinds of introduced databases, such as E-journal, E-book, A/I-database, Fact-database, are detailed analyzed. Some researches on the new tendency in the process of introducing electronic resource are embodied. The new problems in the resource construction of libraries and the far-reaching effect on information service are also discussed.

**Keywords:** Electronic resource; Consortium purchase; Resource construction; University libraries

## 1. Introduction

The electronic resources are developing as the kernel part of collection of the university library in the mainland of China, and the consortium purchasing is the main channel to introduce those foreign electronic resources. According to the data affording by CALIS management center, CALIS had totally organized 72 consortiums, including 6 new ones, 1 paused, 2 combined up to May, 2007. There were 674 universities and scientific institutions involving in the consortium purchase organized by CALIS. In 2006, the whole expense of consortium purchase is about ¥3.24 hundred million, and ¥1.77 hundred million about bounded paper periodical, the two is totally about ¥5.01 hundred million. There were ¥4.92 hundred million about electronic resource and bounded paper periodic purchasing.

The number of electronic resource increased in fast-speed. There have been a number of questions and new tendencies emerged accompanying with the consortium purchase which should be researched and discussed. It is necessary to carefully evaluate the efficiency of introduced electronic resource and analysis its usage. The work should help us adjust our policy to reach the highest efficiency of resource construction.

## 2. The overview of consortium purchase

### 2.1. Database introduced by consortium purchase

There were 95 electronic periodicals databases, 28 electronic book databases, 126 I/A database, 49 fact databases, and 4 databases about bibliography and personal data-management software. The data shows there have been a great development in consortium purchase from the number of users and the number of databases introduced and the expense of introduced databases.

	2004	2005	2006	2007	The growth proportion of 2007 over 2004
Group number	55	60	69	72	30.91%
Database number	202	216	283	302	49.50%

User number 1 <sup>1*</sup>	721	790	615	674	-6.52%
User number 2 <sup>2*</sup>	2,985	3,371	3,512	3,769	26.26%
University user number 1 <sup>3*</sup>	584	614	565	621	6.34%
University user number 2 <sup>4*</sup>	2,682	3,084	3,402	3,663	36.58%
Database costs <sup>5*</sup>	2.08	2.72	2.96	3.24	55.77%
Bounded Paper journal costs	1.35	1.61	1.69	1.77	31.11%
Total costs	3.43	4.33	4.65	5.01	46.06%
University total costs(¥)	2.84	3.68	4.21	4.92	73.24%

Note:

1\*: libraries that took part in the consortium purchasing organized by CALIS have been included. A library that bought five databases had been counted one time.

2\*: The number of databases purchased by every library has been included. A library that bought five databases has been counted 5 times.

3\*: Excluding non-university users from the user number 1.

4\*: Excluding non-university users from the user number 2.

5\*: The monetary unit is hundred million Yuan.

The number of group has increased by 120%, and the expenditure had increased by 65.89%. Some famous databases were introduced with quick success; they satisfied scientific researchers and teacher's scientific information requests. The rapid increase of electronic periodical database brought challenge to Liberians, but at same time, it also presented a number of questions to the library.

## 2.2. The increasing proportion of introduced database

There were 674 libraries purchasing 3, 769 databases, the total cost was 5.01 hundred million Yuan. Among them, the user and the cost of E-journal database was both the most, and cost of it accounted for 77% of the total cost of the Group. What follows was the A/I database, its cost accounted for 14.4% of the total cost of the Group, and the e-book costs accounted for 4.3% of group costs. In addition, the group bought 475 fact database, costing 0.21 hundred million Yuan, accounting for 4.2% of the group costs.

Table 2 shows the Growth of several major databases introduced by CALIS consortium Purchasing increased in the proportion of several databases.

	2004	2005	2006	2007	The growth proportion of 2007 over 2004
Group number of E-journal	25	33	34	37	48.00%
Database number of E-journal	43	53	80	95	120.93%
The number of E-journal	18,481	20,212	29,703	34,964	89.19%
The user number of E-journal	1,857	2,119	2,045	2,261	21.76%
The cost of E-journal database	1.29	1.68	1.85	2.14	65.89%
Bounded paper journal costs	1.3	1.53	1.63	1.72	32.31%
The total cost of E-journal	2.59	3.21	3.48	3.86	49.03%
The number of E-book	68,204		150,176	194,874	185.72%
The number of E-Proceedings			8,557	15,667	83.09%
The number of A/I database	14	14	16	17	21.43%
The user number of A/I database	741	804	805	779	5.13%
The cost of A/I database	0.62	0.81	0.78	0.72	16.13%

### **3. The analysis of several main electronic resources**

#### *3.1 E-journal*

From 2004 to 2007, the number of E-journal databases increased 120%. The fee increased 65.89%. Some well-known databases in academic circle had been introduced in succession. They greatly satisfied the information need of technical and scientific staff. But they were also bringing new problems and challenges for the libraries of universities in the Mainland.

Collection repetition is a main problem after introducing a sum of full-text databases faced many university libraries now in China. The repetition exists in different full-text databases, especially between the full-text database by integrated bookstores like EBSCO or CSA ProQuest and by publishing companies. Publishing companies sold electronic copyright of their periodicals to integrated bookstores, so the integrated bookstore could provide a large sum of periodicals, which belong to varied publishing companies in the same interface. The integrated full-text databases cover most of scientific subjects and have comparable low cost, but part periodicals have a period time delay, from 6-24 months. The periodicals in publishing companies' databases would be updated in time, even before the paper periodical being printed, but they are expensive. When libraries bought a large sum of databases, the repetition between databases could be avoided. It needs library checklist of full-text databases carefully and to be evaluated as a whole system.

There is another reason that caused repetition, i.e. the repetition between electronic database and their bounded paper periodical. Now, many university libraries are forced to keep their paper periodical orders at same time with their databases. The repetition brings a heavy burden to those libraries that want to keep both paper and electronic content. The libraries want the bounded policy could be released, but the publishing company, either commercial companies or nonprofit institutes, in order to ensure the profit of their paper periodical order, and it should not be changed in a short time. Some publish companies also afford their customers e-only order pattern. But to most of domestic libraries, to keep the primary resource construction, paper periodical plus their electronic version, or quitting the paper periodical completing? This chooses put some libraries in dilemma.

#### *3.2. E-book*

The electronic book discussed in this paper refers to the databases introduced by CALIS consortium purchase. The sale of academic digital electronic books has constituted more than 50% in the whole global sale of integrated book-sales and publishing companies. In the report by ATO consulting company made for Elsevier, the data show the usage of electronic book is much higher than that of paper books. The usage of ScienceDirect series is almost 6 times above the average loan of paper ones in member libraries of SCOUNUL in 2006, and in the same year, the usage of electronic handbook in ScienceDirect is 155 times over than loan in member libraries of ARL. The research shows the electronic book in library resource construction continues to increase. In 2005, the electronic book almost increased 65% in libraries of England, at the same time; the paper book only increased 5%. Showed SCOUNUL's investigation According to figure showing in one reported by SCOUNUL, not only the scale of E-book collection is creasing, but the numbers of library that have the E-book are also increasing. So ATO consulting company drew the conclusion that the significance of E-book is far more than that of paper book for the cost of E-book is only taking 31% of that of paper book but the usage of E-book is 6 times over that of paper book.

At present, University libraries in Mainland have encountered many problems in the process of

purchasing book, such as short of funds, limited room, limited species of foreign book, not enough copies of reference materials for teaching, booking for the popular book, a mass of recall, disconnecting in collection of book, the limitation of open time and so on. The effective way is increasing E-book collection. Showing by the cruising data in one user questionnaire in Tsinghua university, there is 71.59% reader suppose that the best way to settle above-mention questions in short of funds is to buy more E-book. So, it is reasonable to suppose that E-book would get instant development.

Whereas, the development of E-book is slow when comparing with that of E-journal. Firstly, the publishers treat E-book with caution. With little exception, every publisher put their E-journal earlier than their E-book. Libraries also found that the publishers' marketing strategy for E-book is more conservative. The price of E-book has less attraction for users for they are almost higher than their paper counterparts. Secondly, readers like paper books more than E-books, and Chinese reader read less scientific and technical books in English. Above two reasons caused lower usage and less desire to purchase E-book. Thirdly, libraries put more attention on the collection of periodical. The journal has more fund than that of book.

### *3.3. A/I database*

At the beginning of consortium purchase organized by CALIS, A/I databases was the focus. But now the full-text databases became the lead character. From 2004 to 2007, there only increased 3 A/I databases, the growth rate is 21.43%. But the usage and use cost, the two indexes approved that A/I databases was surely in need.

The development of A/I database has close connection with the development of computer and network. It took a short period of time to finish the evolution process from paper version to stand-alone version, network CD-Rom and network database. With the further development of network, net search engine, as google, is becoming the important tool to collect scholar information. Some publishers put the Abstract and index of their full-text on the server of net search engine, open to all users. Readers could retrieve the search engine first, to find what were they interested in, and then collect the full-text, which they were the licensees. From the reader to the full-text, A/I databases were omitted; the net search engine did exert an influence on the development of A/I databases.

But the A/I databases still follow its own road in developing. Functions such as personalized service, feature customization, full-text linking, document delivering, were continually added. Some famous A/I databases focus on academic evaluation, others was moving forward on the way to become information gateways by integrating with other information resources. By the result of integration, full-text link direct readers to monographer, journal paper or proceedings paper. Besides, net academic resources had been one part of A/I database after selected and index. Furthermore, some libraries had begun their cooperation with A/I databases; libraries' OPAC had been integrated with databases by z39.50 or OpenURL.

Competition between information products became more intense in the Internet Age. The same type of services or products are often only a comprehensive expression of the will be able to survive. The characteristics of the content or services is not enough to become the core competitiveness. The integration of more resources as soon as possible to become a full subject and complete coverage of resource types have a certain amount of information portal to be invincible.

### *3.4. Fact database*

Fact databases have strong professional, not only provide support for research work, but also can facilitate the daily life. Knowledge database, numerical database, law and regulations database, directory database, image database, multi-media database, experimental report database were all included in the category of fact

database. It is difficult to identify those which both have factual data, real-time news, and abstracts or full-texts of some journals, like ProQuest Asian Business.

According to one survey conducted by Zhang Min in Fudan library, the higher percentage of fact database in electronic resource is 27% among university libraries in Mainland, far lower than that of foreign university libraries that could remain in 40%. Generally, fact databases only provide information for specific area; libraries also choose which could serve more readers for limited budget, so the fact databases were cold-shouldered.

There were a large number of databases, but with quality mixed. Some databases could not guarantee punctuate updates, data consistency, and full coverage. These challenges would seriously affect the quality of database. Libraries should evaluate them carefully. But the existing assessment system and evaluation indicators for databases were for documental database, not suitable for fact databases. An assessment system for fact database is necessary.

#### 4. The analysis of main existing problem of consortium purchase

In addition to the advantages of consortium purchasing of electronic resources to reduce the purchase price, saving the libraries time and energy to negotiate with the databases, and better promote them to provide a good after-sales service and technical support, the group of data makes.

##### 4.1. The regional distribution of electronic resource

Table 3 is the statistics and analysis of regional distribution of colleges and universities, which participated in CALIS consortium purchasing the e-resources. The number of university in Northern China taking part in the consortium purchase is 86, topped among other areas of China. The number of databases and the total fee of universities in Northern China were also far more than that of other area. The number of databases purchased by per library of Southern China was highest; each library purchased an average of 9.2 databases, of course, the fee was also the highest, The average cost of each library to purchase electronic resources for ¥ 1.2089 million yuan.

Area	University user number	Number of purchased database	Number of purchased database	Total cost (ten thousand Yuan)	Proportion of total cost of Group	Average No. of database purchased by each library	Cost of each university (ten thousand Yuan)
Northeast	33	54	230	2,754.0	8.44%	7	83.45
North China	86	66	589	7,772.4	23.79%	2.1	90.38
North Region of East China	56	58	404	5,433.2	16.63%	7.2	97.02
South Region of East China	52	64	442	5,868.4	17.95%	8.5	112.85
South China	27	61	249	3,264.0	9.98%	9.2	120.89
Central China	37	59	286	3,570.0	10.92%	7.7	96.49
Northwest	24	46	146	1,856.4	5.68%	6.1	77.35
Southwest	28	47	132	1,897.2	5.80%	4.7	67.76
Total	343	66	2,478	32,415.6		7.2	94.51

The cost of purchase of resources in Northern China accounted for nearly 1/4 of that of the country's total cost, but The Southwest and Northwest both together accounted for less than 1/5. The regional imbalance of economic and cultural of China led to the uneven distribution of introduced resources.

Furthermore, uneven distribution of Information resources will further aggravate the imbalance between regions imbalance in the development of science and culture, and this situation would not changed in a short time.

#### 4.2. The use of the electronic resource

Statistical data show that the use of the database is also in great imbalance. We lined up users by each database in descending order, the top half of user's total usage accounted for 80%, even 90%, of the total usage. That means the other part accounted for only a very small part of the total. What was surprising was that some libraries with unsatisfactory usage still maintained order for several years.

The gap of database usage between different libraries was partly due to the unscientific policy of collection construction. Resource acquisition goal is not "do you have I have". Now colleges and universities have been broadly divided into research and teaching two types of models. The two have quite different information needs. The university library should take it into consideration, and to seek the harmonization and unification between unlimited demands and limited funds. Some databases with poor usage should be cut after careful evaluation and ILL or document delivery should help meet the resulting failure to complete information.

Electronic resource has its own characteristics and applicability. As an information product, electronic resources require certain information environment to support its use. As the network infrastructure development of colleges and universities in Mainland China, most colleges and universities have a good network environment. But comparative to the hardware, the libraries services have a greater impact to the purchase and use of the electronic resources. According to the Barrel Theory, defects of information services made some libraries that have good network environments and rich electronic resources get satisfied usage of some databases.

Database	University user number	Percentage of the prior-half-user to the volume of total usage <sup>1*</sup>	Database	University user number	Percentage of the prior-half-user to the volume of total usage <sup>1*</sup>
ABI Complete	21	80.70%	JCR	31	90.73%
ACM	64	86.00%	JSTOR	25	82.17%
ACS	72	89.53%	LexisNexis	7	53.23%
AGRICOLA	33	93.27%	LexisNexis	50	81.16%
AGRIS	32	93.44%	LexisNexis (AU)	27	81.60%
AIP	68	90.80%	LWW	38	85.60%
APS	71	89.14%	MDC	9	84.52%
ARL	25	78.99%	Micromedex Healthcare Series	14	65.16%
ASCE	44	90.77%	Nature	34	88.82%
ASME	59	90.09%	Netlibrary	58	88.41%
Beilstein/Gmelin CrossFire	16	77.20%	OSA	11	80.28%
BioOne	5	73.14%	OUP	26	84.68%
BIOSIS	66	90.16%	PESTBANK	4	98.98%

Blackwell	34	79.53%	PML/PHMC	21	82.03%
CABI	26	88.69%	PQDD Dissertation	120	86.98%
Cell	21	88.02%	PQDT (A)	20	88.87%
ChinaInfoBank	106	95.79%	PQDT (B)	62	90.86%
CSA	43	92.94%	ProQuest Agriculture	29	86.15%
DII	19	76.93%	ProQuest Biology Journals	34	88.53%
EB	62	87.72%	Reviewcom	10	86.54%
EBMR	14	86.75%	RSC	32	84.36%
Ebrary	10	94.28%	Safari	11	88.23%
EMBASEcom	10	86.11%	SAGE	6	81.21%
Emerald	13	58.22%	SCI	43	87.11%
ESI	4	78.71%	Science	36	86.82%
EV2	129	89.30%	Scopus	2	97.58%
FirstSearch	106	91.13%	SD	162	87.05%
FSTA	14	95.83%	SFS	22	81.07%
Gale	26	70.68%	SLCC	18	87.58%
IEL	56	83.19%	SPIE	21	78.31%
Inspec	51	82.05%	SpringerLink Online book	24	69.64%
IOP	28	84.30%	SSCI&AHCI	9	92.11%
ISI Proceedings	63	82.29%	Wiley	60	90.47%
IWA	5	75.62%	WSN	6	60.45%

Note:

1\*: The usage of each university of one database was arranged from high to low, and the prior-half was added. Then the percentage was the result took the proportion in the total usage.

#### 4.4. The price of electronic resource

In the early stage of consortium purchase, most of foreign database providers had no idea about Chinese market. They were welcome and relied on the co-operation with CALIS. Their tentative price and sale strategies were consistent with the purposes of CALIS. But it was changed after becoming familiar with the customers and the Chinese market. They put more products as well as human and material resources to develop and nurture this vibrant new market.

At the same time, some of them adjust the sale policy. They wanted Chinese customers to move quickly closer to the international market, China was on the list of developed country instead of developing country for the rapid growth of GDP in recent years. This not only increased the burden of domestic university libraries, but also created a greater contradiction with the purpose of CALIS. The rapid growth of China's GDP does not mean that domestic colleges and universities gained the financial support of equal growth. It was even more difficult for university libraries to cope with the normal increase in price with the existing fund. If database providers insisted on cutting preferential prices in China, domestic libraries have to reduce ordering databases. It is just robbing Peter to pay Paul.

Some database providers fixed price according to the size and usage of a college. The database providers always compare the size of domestic colleges with that of foreign universities but ignore China's special situation. The huge population of China and university admission policies give birth to ultra-large-scale universities as well as the corresponding greater use. If the database provider insisted on existing price model, libraries can only control the use of one hand, and cut order quantity on the other hand. From the development point of view, this does not fit their long-term interests in the Chinese market.

## **5. Conclusion**

The electronic resources are becoming the kernel part of the library resource and the important foundation of information service of university libraries of Chinese Mainland. In recent years, the number and type of introduced databases increase in rapid speed. It brought opportunities and challenges for library to construct electronic resources. In this paper, the statistical data of these four main kinds of introduced databases, such as E-journal, E-book, A/I-database, Fact-database, are detailed analyzed. The apparent area gap of electronic resource distribution and great disparity between the usages are presented, and the reasons are also deeply probed by the authors. Some researches on the new tendency in the process of introducing electronic resource are embodied. The new problems in the resource construction of libraries and the far-reaching effect on information service are also discussed.

Consortium purchase is the main mechanism to introduce electronic resource in this development process. The tendency of resource evolution can affect the choice of libraries, at the same time, the consortium purchase also have some effect on the distribution area of resource and its usage. As mention in the paper, the rapid growth in quality and variety of introduced electronic resource has brought the new and exciting challenge to the library and librarians.

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## **Corresponding author**

GUI Jun can be contacted at: [guijun@lib.tsinghua.edu.cn](mailto:guijun@lib.tsinghua.edu.cn)