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A BIBLIOMETRIC STUDY ON ARTICLES OF MEDICAL LIBRARIANSHIP

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Abstract—Three medical library periodicals published in China, Japan and U.S.A. were selected for this study. During the years 1990–1992, 36 issues, 410 articles, and 2915 cited references were compared to find each country's trends of research in medical library and information services by way of a bibliometric method. The citation characteristics in the periodicals provided evidence that differences were likely attributable to the fact that the three periodicals were published in different countries.

Citation analysis, the most celebrated scientometric technique, has been increasingly applied to research evaluation in recent years and has been described in various degrees in the literature. The purpose of the present study is comparison of three medical library periodicals during the period 1990–1992 by means of citation analysis. The article examines and compares the articles published among 1990 and 1992 in the *Medical Information Service* (MIS) in Chinese, *Journal of the Japan Medical Library Association* (JJMLA) in Japanese and *Bulletin of the Medical Library Association* (BMLA) in English. Research methodology, subjects of the source articles, types of cited publications, age of cited references, frequently cited periodicals, as well as number of pages and number of references in the articles were analyzed.

METHODS

MIS, JJMLA and BMLA were selected for this study because the periodicals have been in existence for at least 10 years and are recognized as nationally known periodicals of medical library science. MIS had its first issue in 1979 and is a brief communicative periodical for medical librarians and medical library educators. JJMLA had its first issue in 1954 and is a general professional periodical for medical librarians. BMLA began in 1911 as the successor to the *Medical Library Historical Journal* (Vols 1–5, 1903–1907) the *Bulletin of the Association of Medical Librarians* (Vol. 1, 1902) and *Medical Libraries* (Vols 1–5, 1898–1902), and is a survey research periodical for health sciences librarians. The numbers of articles, pages and references were counted in each issue of each of the three periodicals during the period 1990–1992.

For the study, full articles, symposium articles, case reports, brief communications, review and prospect, teaching and studying were included. Editorials, letters to the editor, comments & opinions and book reviews were excluded, even if they had citations. All references were counted, with no distinction made between types of sources cited. When articles cited the same sources more than once, only the first citation was counted; Citations such as *ibid* and *op. cit.* were not counted.

Research and research articles

Defining research and research articles is the main problem in this study. Using Peritz's (1981) definition, those research articles report an inquiry which is carried out, at least in part,

by a systematic method with the purpose of eliciting some new facts, concepts, or ideas; and 157 articles were identified as research articles and given further content analysis.

Types of research methods

Each article was classified according to research methods. Twelve research methods, slightly revised, described by Feehan *et al.* (1987) and Dimitroff (1992) were used: they were theoretical analysis, descriptions/survey, experiment/investigation, bibliometrics, content analysis, secondary analysis, comparative study, historical research, multiple method, observation research, operation research and delphi method.

Subject categories of articles

Each article was classified according to research subject. Subject identification is always a problem because too narrow a definition makes the results almost meaningless and too broad a definition produces a bewildering mass of material (Atkins, 1988). In order to permit comparison of the results with those of previous studies, a general classification of subjects that was described by Feehan *et al.*, (1987) and Dimitroff (1992) was also used.

Publication types

The categories of publication types for the sample of citations were periodicals; monographs (books other than works of collective authorship, manuals, encyclopedias); proceedings (including proceedings and conferences, meetings, workshops, seminars, lectures and symposiums); handbooks and dictionaries; standards and classifications; reports and dissertations; newspapers and abstracts; catalogues and pamphlets; unpublished materials (memos, loose leaves).

Languages of citations

Seven language categories were used: Chinese; Japanese; English; German; French; Russian and other.

Subject classification of cited periodicals

The subject classification of publication used as library and information science (LIS); medical science (MS); social science (SS); science and technology (S&T) and others. *Ulrich's International Periodical Directory 1990-1991* was consulted to determine the subject area of the cited periodicals.

RESULTS AND DISCUSSION

In general, a citation checking method is based on the principle that actual use of bibliographical material is an indicator of its relevance to current research in a discipline (Fang, 1989). Although there are some limits to citation analysis (Brittain, 1973; Motylev, 1989; MacRoberts, 1989) and more than three-quarters of scientific articles make negligible contributions to knowledge (Hamilton, 1990), a majority of researchers have concluded that citation frequency can serve as an indicator of the perceived quality or importance of research articles of the value of periodicals (Garfield, 1972; Wiberley, 1982; Dong, 1989; Braun *et al.*, 1985; Masuda, 1990).

Table 1. Distribution of research articles

Issue No.	MIS (N=177)		JJMLA (N=108)			BMLA (N=125)		
	1991	1992	1990	1991	1992	1990	1991	1992
1	4	5	3	2	1	5	6	5
2	5	7	4	3	2	6	4	6
3	3	4	2	3	2	5	5	4
4	7	6	6	3	3	5	4	6
5	5	6						
6	6	4						
Total	30	32	15	11	8	21	19	21
%	16.19	18.08	13.89	10.19	7.41	16.8	15.21	16.8

*(A) Methodology and Subject**Research articles*

Using Peritz's (1981) definition, 157 articles were identified as research articles. Table 1 shows the distribution of research articles.

This percentage of research articles is lower than that reported by Peritz, Nour, Feehan and Dimitroff. Peritz (1981) reported 31% in 1975. Nour (1985) reported 24.4% in 1980. Feehan (1987) reported 23.6% in 1984 and Dimitroff (1992) reported 29.8% from 1966 to 1990.

Length of research articles

The three periodicals contained a total of 3361 editorial pages. Table 2 shows the number of pages defecated to research articles.

The average length of all articles in the regular issues of the MIS is 2.95 and 3.65 pages for research articles. The average length of all articles in the regular issues of the JJMLA is 7.09 and 8.21 pages for research articles. The average length of all articles in the regular issues of the BMLA is 6.84 and 7.74 pages for research articles. Comparing earlier research findings by Chen and by Dimitroff, Chen (1977) found that the mean length of articles ranged from 6.6 to 8.95 pages in 1970. Dimitroff (1992) found that 56.2% were 5–9 pages long, 23.7% were 1–4 pages long and 14.9% were 10–14 pages long.

Research method

Each article was categorized according to the classification of research methods used by Feehan (1987) and Dimitroff (1992). Table 3 shows the research strategies in the 157 articles.

Table 2. Research articles by pages

Pages	MIS (N=786)	JJMLA (N=1288)	BMLA (N=1281)
2	6		
3	25		
4	19	1	3
5	6	4	2
6	4	6	12
7		5	15
8	1	7	11
9		3	9
10		4	3
11		1	1
12+		3	5
Total	225	279	472
%	29.31	21.71	36.85
Mean	3.65	8.21	7.74

Table 3. Research methodologies used by 157 research articles

Methods	MIS		JJMLA		BMLA	
	N=62	%	N=34	%	N=61	%
1	7	11.29	2	5.88	6	9.84
2	14	22.58	6	17.65	15	24.59
3	12	19.35	6	17.65	13	21.31
4	17	27.42	2	5.88	5	6.56
5	4	6.45	4	11.76	1	1.64
6	3	4.83			2	3.28
7	2	3.22	5	14.7	4	6.56
8					1	1.64
9					1	1.64
10	1	1.61	2	5.88	2	3.28
11	2	3.22	7	20.59	11	18.03
12					1	1.64

1, Theoretical analysis; 2, description/survey; 3, experiment /investigation; 4, bibliometrics; 5, content analysis; 6, secondary analysis; 7, comparative study; 8, historical research; 9, multiple; 10, observation research; 11, operation research; 12, delphi method.

In Table 3, bibliometrics was the most popular method with 27.42% in MIS, description/survey was second with 22.58%. In JJMLA, operations research accounted for 20.6% of all articles, and both description/survey and experiment/investigation for 17.65%. In BMLA, description/survey accounted for 24.59% and experiment/investigation for 21.31%. When the above results compared with those of previous studies, the differences are obvious. Peritz (1981) found that survey method was 38% and historical study was 17%. Nour (1985) reported that survey method was 41.5%, and the second and third-ranking methods were theoretical/analytic (21.2%) and bibliometrics (10.9%).

Yamanaka (1987) found that the quantitative method increased from 8.0% in 1955 to 20.3% in 1985, while the descriptive method decreased from 64.9 to 30.4%. Jarvelin and Vakkari (1990) reported that the most frequent empirical research strategy was the survey, its proportion of all studies was 22.9%, bibliometrics only accounted for 4.2%. Enger (1989) reported that a total of 88.9% of the articles used either no statistics, or descriptive statistics. Jiang (1991) found that the abstract method and the analytical method of summing up experience were the mostly used and accounted for 59.0%. Dimitroff (1992) found that surveys accounted for 41.0%, observation research for 20.7%, bibliometrics for 13.8% and operation research for 12.1%.

Subject coverage

A general classification of subjects adapted from a subject classification by Feehan *et al.* (1987) is shown in Table 4.

In Table 4, evaluation of books or periodicals was a little higher than other specific subjects in the MIS, and this supported Atkin's (1988) indication that citation analysis was another specialized subject that had proved popular in LIS and was strong for more of this type of research during the next decade. Dissemination or retrieval information and CD-ROM were a little more frequent than other subjects in the JJMLA. Dissemination or retrieval information, public service and cooperation or networks were more frequent than other subjects in the BMLA.

Compared with earlier research findings, the dissemination or retrieval of information was significant greater. However, Iijima (1990) pointed out that research on retrieval of information had been focused on end-user searching and CD-ROM rather than on-line bibliographic searching. Nour (1985) reported an almost 3-fold increase in articles on automation and a decline in emphasis on history (15.0% of the dissertations compared with 6.7% of the source articles). Atkins (1988) determined that management, databases and cataloging were slowly declining, while automation, databases and technological subjects had become more

Table 4. Research articles by specific subject area

	MIS	JJMLA	BMLA		MIS	JJML	ABMLA
1.1: History of libraries	5		1	4.1: Administration	2	1	3
1.2: Libraries and society	1		2	4.2: Public services	3		6
1.3: International libraries		1		4.3: Technical services	3	1	
2.1: Organizations	2			4.4: Systems		2	3
2.2: Education for librarianship	1		4	4.5: Collections	3	4	2
2.3: Status	5	1	5	4.6: Buildings			1
2.4: Ethics	1			4.7: Networks	3	3	6
2.5: Other				4.8: Library users	3	1	4
3.1: General				5.1: Publishing	3	3	5
3.2: Communication theory		1		5.2: Education for users			3
3.3: Information science theory	1			5.3: Journals evaluation	13		
3.4: Structure of knowledge	3	1	3	6.1: CD-ROM services	2	6	2
3.5: Organization of knowledge	5	1	3	6.2: Other	2		2
3.6: Retrieval of information	1	8	7				

knowledgeable. Feehan *et al.* (1987) explored that as much as 28.5% of their sample dealt with automation. Jarvelin and Vakkari (1990) reported that information storage and retrieval was 29% and clearly the strongest emphasis in research articles was given to information retrieval from bibliographic databases (12.7%). Buttar (1991) observed that cataloging, automation, management, and LIS education headed the list. Qiu (1991) reported that information science and retrieval of information was in the ups. Chen (1977) found that document delivery was frequently discussed from 1969 to 1972; regional medical libraries and regional medical programs were covered from 1968 to 1972. Iijima (1990) found that librarians' research on traditional activities, such as classification, cataloging, audio visual and circulation services had clearly been decreasing since the middle of the 1980s in both the BMLA and the JJMLA, while information centers were a higher percentage in both JJMLA (40%) and BMLA (34%). Wang *et al.* (1992) found that document management (33.27%), organization of knowledge (23.65%), and retrievals of information (8.45%) were most popular. Dimitroff (1992) found that dissemination or retrieval of information was 10.7% of all articles, cooperation or networks were 6.6% and organization of knowledge or information was 6.3%.

(B) Bibliometric Analysis

Characteristics of references

All scientific publications rely on a great number of ideas communicated previously (Braun *et al.*, 1985). According to Moravcsik and Murugesan (1975), references in scientific publications may be viewed as a particular language of scientific information. More recently, Little *et al.* (1988) reported that the number of references per article increased in scientific periodicals among 1980 and 1987. The referencing characteristics of articles in the three periodicals are presented in Table 5.

Thirty articles (27.78%) written by JJMLA authors cited no references and 39 articles (22.03%) written by MIS authors cited no references. This percentage is higher than those found by both Peritz and Nour. Peritz (1981) found 21% over a 25-year sample and Nour (1985) found 16% of research articles lacked references. Only 3 articles (2.34%) written by BMLA authors cited no references; this percentage is lower than that found by Dimitroff (1992), who found that from 1966 to 1990 9.9% of research articles in BMLA lacked references. The percentage of articles without references decreased considerably as compared to previous studies.

Table 5 also shows data on the average numbers of references per article. The average in MIS was 3.11, 2.80 less than JJMLA and 10.03 less than BMLA. However, this percentage was a little higher than the majority of LIS periodicals in China, as found by Qiu (1991) and by Wang *et al.*, (1992). Among the 1682 citations in BMLA, 222 (13.12%) were to articles previously published in BMLA; of the 683 citations in JJMLA, 104 (16.31%) were to articles previously published in JJMLA; and of the 550 citations in MIS, 115 (20.91%) were to articles previously published in MIS.

Table 5. References characteristics of MIS; JJMLA; BMLA

	Referenced		Unreferenced		Mean No. of references	Periodical self-citation
	Articles	%	Articles	%		
MIS	138	77.97	39	22.03	3.11	20.91
JJMLA	78	72.22	30	27.78	5.91	16.31
BMLA	122	97.66	3	2.34	13.14	13.21
Peritz					8.7	1950-1975
Nour					12.6	1980
Dimitroff					9.23	1966-1990
Chen					5.73	1969-1973
Fang					9.26	1982-1986

Types of publications

The distribution of references to each type of publication is given in Table 6. In Table 6, more periodical articles than monographs are cited in all three periodicals and BMLA had the highest percentage. The proportion of monographs cited by MIS was the highest and BMLA was the lowest. The former may result from the fact that many monographs on Library and information science have been published in China. The number of proceedings, sometimes called "gray literature", by JJMLA was the highest, which may be due to the many conferences, symposiums, and seminars on library and information science held every year in Japan. BMLA citations to reports and dissertations were the highest and MIS citations to unpublished materials were the highest.

Distribution of languages

In a study of citation from several core LIS periodicals, Foster (1968) reported high dependence on English language periodicals by American authors. LaBorie and Halperin (1976) noted the strong national and language bias in choice of citations. The present study again confirms language bias in citation practices by BMLA's authors. Table 7 shows the percentage for each the three periodicals.

Table 6. Distribution of types of publications

	1	2	3	4	5	6	7	8	9
MIS %	65.45	22.18	3.27	3.27		0.55	1.27		4.01
1991	212	78	10	9		2	4		10
1992	148	44	8	9		1	3		12
JJMLA%	61.91	16.31	7.68	7.05		0.94	1.11	4.86	0.16
1990	182	41	19	31		1	4	11	1
1991	123	31	13	6		2	2	17	
1992	90	32	17	8		3	1	3	
BMLA%	67.84	13.56	4.34	5.41	0.54	3.49	1.13	3.75	
1990	423	99	23	32	3	16	4	18	
1991	311	66	11	26	1	14	9	21	
1992	407	63	39	33	5	28	6	24	
Peritz	46.97	28.04	3.74						
LaBorie	23.2	42.9							21.4
Sakurai	33.01	30.1							
Nour	44.5								
Fang	63.5	26.1	1.3						
Chen	55.63	21.04	3.2						
Qiu	43.2	50.9							
Raptis	41.01	29.19	5.07						

1, Periodicals; 2, monographs; 3, proceedings; 4, handbooks/dictionaries; 5, standards/classifications; 6, reports/dissertations; 7, newspapers/abstracts; 8, catalogues/pamphlet; 9, unpublished materials.

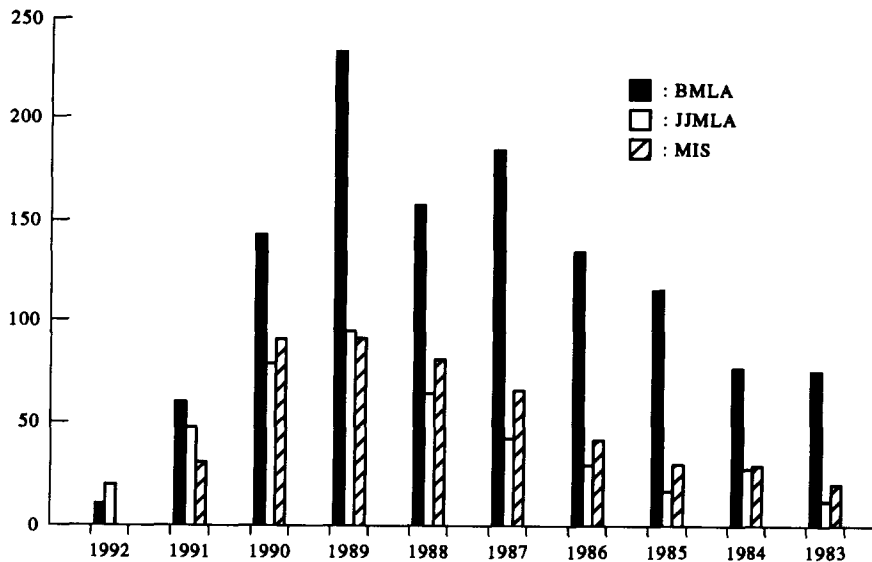


Fig. 1. Age of reference cited.

1945 publication. Figure 1 shows a histogram of age of the cited publication.

54.73% of MIS references were among 1988 and 1991, with no 1992 references, as MIS published the articles a year and a half after receipt (received time to acceptance time was 3 months and acceptance time to publication time was 15 months). 36.33% of BMLA references were among 1988 and 1992, and 48.9% of JJMLA within this time. Moreover, JJMLA's 3.29% of JJMLA references were published in 1992. This percentage is higher than that of BMLA. Around half of the citations in BMLA, JJMLA and MIS are within 5 years and this result entirely agrees with the results reported by Qiu (1991) and by Raptis (1992). Figure 1 shows that 1989 is the highest point of the curve. This shows that the publications have become more cited within the first five years and that afterward citations decrease. The half-life might suggest the possibility of more accurate prognostications concerning the period of time during which scientific literature may be used (Raptis, 1992).

Distribution of subjects

Every citation represents an author's decision that an article was relevant to his special theme from a wider pool of potentially relevant citable items (Burton & Kebler, 1960). Table 9 shows the proportion of subject contribution to the publications.

In Table 9, over half of the citations cited by three periodicals are from LIS. MIS is the highest with 83.82% and BMLA is the lowest with 60.16%. MIS cites references in SS more often than

Table 9. Proportion of subject contribution to the publications

	MIS		JJMLA		BMLA	
	N=550	%	N=683	%	N=1682	%
Libr. & Infor. Science (LIS)	461	83.82	455	71.32	1012	60.16
Medical Science (MS)	29	4.73	96	15.05	477	28.36
Social Science (SS)	38	6.91	48	7.52	105	6.24
Science & Tech. (S&T)	7	1.27	25	3.29	23	1.37
Others	15	2.73	14	2.19	65	3.86

Table 10. Subject distribution of cited periodicals

	MIS		JJMLA		BMLA
	Chinese	English etc.	Japanese	English etc.	English
Libr. & Infor. Science (LIS)	34	5	17	19	79
	39.53	5.81	15.45	17.27	25.24
Medical Science (MS)	21	7	24	35	162
	24.42	8.17	21.82	31.82	51.76
Social Science (SS)	14		7	1	44
	16.28		6.36	0.91	14.06
Science & Tech. (S&T)	5		4	3	28
	5.81		3.64	2.72	8.59

in MS, while BMLA and JJMLA cited MS more than SS. The proportion of BMLA references citing LIS (60.16%) and MS (28.36%) in the present study is fairly consistent with the proportions calculated by Fang (1989) who observed 62.92% of cited references were from LIS and 28.02% from MS. Table 10 shows the subject distribution of cited periodicals.

In Table 10, the cited periodicals were classified into four broad categories. Evidently MS periodicals are cited most in BMLA and JJMLA. JJMLA's authors cited more LIS and MS periodicals in English than in Japanese. However, although a great number of MS periodicals were cited, the majority of them were cited only once. MIS's authors used more LIS periodicals. In Fang's (1989) study, 44.07% of references were MS periodicals and 30.74% from LIS periodicals, and 89.6% or references were from SS periodicals and 7.0% from MS and S&T periodicals in Qiu's (1991) study. A difference is likely that Chinese librarians chiefly referenced SS periodicals for writing articles of the time.

Frequently cited periodicals

Citation analysis is employed to identify objectively the most frequently cited periodicals. Table 11 shows the application of citation analysis to rank periodicals.

Citations were derived from 313 periodicals in BMLA, BMLA is its most cited periodical and JAMA is the second most cited periodical. Citations in JJMLA were derived from 110 periodicals, JJMLA is the most cited periodical and BMLA is the second most cited. Citations in MIS were derived from 86 periodicals; MIS is the most cited periodical and *Bulletin of Information Science* is the second most cited periodical. When comparing this ranking of periodicals to Fang's and Chen's studies, BMLA's authors have some changes in their citing patterns. JAMA rose to second ranked from fifth-ranked in Chen's (1977) study. *Annals Internal Medicine* rose to the fourth position from the ranked in Fang's (1989) study. *Library Journal* dropped to the fifth rank from the second ranked and *Special Libraries* dropped to the tenth ranked from the third rank in Chen's (1977) study. Further, BMLA citations to MS periodicals are a little higher than in the earlier study.

Only 5.43% of the periodicals accounted for 50.83% of the citations in BMLA, 7.27% of the periodicals accounted for 50.89% of the citations in JJMLA and 5.81% of the periodicals accounted for 53.06% of the citations in MIS. This shows high concentration of the articles in a relatively small number of the periodical titles in the field of LIS, and reflects Bradford's law of scattering. Bradford (1953) described this relationship in his study of the scattering of journal papers on a given subject and determined that the distribution of those papers follows a particular mathematical model. Table 12 shows clearly scatter in each of the three periodicals.

SUMMARY

Although it is difficult to develop a set of model characteristics for the three periodicals, the citation analysis in the above study provides a wide variety of general findings.

Table 11. The periodical frequency in each of the three periodicals

Journal title	No.	Language	%
<i>Bulletin of Medical Library Association</i>	222	English	13.21
<i>JAMA</i>	52		3.09
<i>Journal of Medical Education</i>	51		3.03
<i>Annals Internal Medicine</i>	42		2.51
<i>Library Journal</i>	26		1.55
<i>College & Research Libraries</i>	22		1.31
<i>Medical Reference Services Quarterly</i>	22		1.31
<i>Journal of the American Society for Information Science</i>	18		1.07
<i>Science</i>	18		1.07
<i>Special Libraries</i>	17		1.01
<i>Online</i>	16		0.95
<i>New England Journal of Medicine</i>	15		0.89
<i>Canadian Medical Association Journal</i>	15		0.89
<i>RQ</i>	12		0.71
<i>Serials Librarian</i>	12		0.71
<i>Journal of Allied Health</i>	10		0.59
<i>Medical Library Association News</i>	10		0.59
<i>Journal of the Japan Medical Library Association</i>	104	Japanese	16.31
<i>Bulletin of Medical Library Association</i>	36	English	5.64
<i>Research Bulletin of the National Center for Science Information Systems</i>	13	Japanese	2.04
<i>Laserdisk Professional</i>	11	English	1.72
<i>Journal of Information Processing & Management</i>	10	Japanese	1.57
<i>Annals Internal Medicine</i>	10	English	1.57
<i>Hospital Librarian</i>	9	Japanese	1.41
<i>Hospital Libraries</i>	8		1.25
<i>JAMA</i>	7	English	1.11
<i>Journal of the American Society for Information Science</i>	7		1.11
<i>Library and Information Science</i>	6	Japanese	0.94
<i>CD-ROM Librarian</i>	5	English	0.78
<i>Online Terminal Research</i>	5	Japanese	0.78
<i>Japanese Journal of Clinical Ophthalmology</i>	5		0.78
<i>Medical Education</i>	5		0.78
<i>Medical Information Service</i>	15	Chinese	20.91
<i>Bulletin of Information Science</i>	22		4.01
<i>Science of Information Science</i>	20		3.64
<i>Acta of Information Science</i>	17		3.09
<i>Science and Information Service</i>	17		3.09
<i>Library and Information Service</i>	16		2.91
<i>Bulletin of Medical Library Association</i>	8	English	1.45
<i>World Books</i>	8	Chinese	1.45
<i>Information Work Research</i>	7		1.27
<i>Bulletin of the Library Science in China</i>	6		1.09
<i>Journal of Medical Education</i>	5	English	0.91
<i>Library Science Research</i>	5	Chinese	0.91
<i>Library Journal</i>	5		0.91

The three periodicals contained a total of 3361 editorial pages. The average length of all articles in the regular issues of the MIS is 2.95 pages and 3.65 pages for research articles. JJMLA is 7.09 pages and 8.21 pages for research articles. BMLA is 6.84 pages and 7.74 pages for research articles. The most frequently used research methods were description or survey and experiment or investigation, which were employed in almost all subjects of the three periodicals. The 88.23% of all articles on evaluation of books or periodicals used bibliometrics in MIS. Studies of information science or librarianship in practical situations employed the operations research method.

Evaluation of books or periodicals was a little higher than other specific subjects in MIS. Dissemination or retrieval of information and CD-ROM were a little higher than other specific subjects in JJMLA. Dissemination or retrieval of information, public service and cooperation or networks were higher than other specific subjects in BMLA.

The articles cite more periodical articles than monographs. BMLA had the highest percentage and JJMLA had the lowest percentage. The proportion of monographs cited by MIS was the highest and BMLA was the lowest. The number of proceedings and handbooks and dictionaries

Table 12. Scatter in each of the three periodicals

BMLA				JJMLA				MIS			
No. of journals	No. of articles	%*	%†	No. of journals	No. of articles	%	%	No. of journals	No. of articles	%	%
1	222	0.32	19.45	1	104	0.91	26.33	1	115	1.16	31.94
1	52	0.64	24.01	1	36	1.82	35.44	1	22	2.33	38.06
1	51	0.96	28.48	1	13	2.73	38.73	1	20	3.49	43.61
1	42	1.28	32.16	1	11	3.64	41.52	2	17	5.81	53.06
1	26	1.61	34.44	2	10	5.45	46.58	1	16	6.98	57.51
2	22	2.24	38.31	1	9	6.36	48.86	2	8	9.31	61.94
2	18	2.88	41.45	1	8	7.27	50.89	1	7	10.47	63.89
1	17	3.19	42.94	2	7	9.09	54.43	1	6	11.63	65.56
1	16	3.51	44.35	1	6	10.01	55.95	3	5	15.12	69.72
2	15	4.15	46.11	4	5	13.64	61.01	3	4	18.61	73.06
2	12	4.79	48.73	4	4	17.27	65.06	6	3	25.58	78.06
2	10	5.43	50.83	14	3	30.01	75.69	15	2	43.02	86.39
3	9	6.41	53.21	19	2	47.27	85.32	49	1	56.98	99.99
4	8	7.67	56.01	58	1	52.73	99.99				
4	7	8.94	58.46								
3	6	9.91	60.04								
13	5	14.06	65.73								
7	4	16.29	68.19								
20	3	22.68	73.44								
61	2	42.17	84.14								
181	1	57.83	99.99								

* Cumulative % of total number periodicals.

† Cumulative % of total number articles.

cited by JJMLA was the highest, and MIS was the lowest. BMLA cited reports and dissertations the most and MIS cited unpublished materials the most.

The age curve of cited publications was similar in the three periodicals and a curve line of age of the cited publications showed that references aged more than 10 years being cited less and less, especially by MIS's authors.

As is often the case, relatively few periodicals produced most of the references cited in the periodicals and the single periodical that each cited most frequently was itself.

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