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Library And Information Science Research in Developing Countries and Eastern European Countries: A Brief Bibliometric Perspective

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ABSTRACT

We examined a set of 21 core journals in the field of library and information science (LIS) from 1980–1999 for articles with either principal or co-authors from developing countries (DCs) and the formerly socialist Eastern European countries (EECs). We found that only 826 (7·9%) of a total of 10 400 articles published in 21 journals are from DCs or EECs. The numbers of articles with authors from China, Saudi Arabia, Turkey, Botswana, Ghana, Kuwait, and Taiwan considerably increased and those of India, Nigeria, Pakistan, Brazil, and Poland decreased. Using a bibliometric indicator we found that among the countries with declining trends in the numbers of articles, LIS research is receiving high priority in Nigeria and Pakistan whereas among the countries with increasing trends in articles, it is receiving low priority in China, Turkey and Taiwan. A 'co-word' analysis based on the key words and thematic noun- phrases in the titles and abstracts of a sample of 102 articles published in 1996 to 1999 indicated that bibliometrics is the most frequent topic in LIS research in major DCs and EECs. Information retrieval, information need and information use is among the topics of relatively high interest for the researchers working in DCs in Asia and Africa.

INTRODUCTION

Research activities in developing countries (DCs) and Eastern European countries (EECs) have taken place under adverse historical and political conditions, and are characterized by isolated researchers or

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small groups working without much collaboration.[1–4] Geographical and, in some cases, political isolation and limited funds cut researchers off from formal and informal international communication. This isolation has resulted in a publication pattern in which authors from these countries publish overwhelmingly in local journals. However, the installation of electronic mail networks and the developments in information and communication technologies in recent years have brought out wider exposure of the researchers in these countries to international communication and collaboration.[5]

The ease of communication and increased access to international journals led to a significant shift of publications by DCs and EECs authors from national journals to international journals particularly of the European or the U.S. origin.[6]

As is the case in many fields, the authors of the vast majority of publications in LIS are from developed countries. The contributions from library and information scientists working in DCs and EECs are present as well, but in decreasing numbers. We are particularly interested in the frequencies of research articles by librarians and information scientists in the two blocks in major international journals because publication in a peer-reviewed journal signifies that the research has merit for the information- science community at large. Indeed, the indirect result of a publication by an information scientist working in a DC or EEC is a symbolic announcement that the author and his/her work have been accepted by the information science community. And such acceptance is important to those scientists who must labor in physical environments that can be inadequate for research in LIS and other fields as well.

METHOD

We surveyed item-by-item, a select set of 21 core journals in LIS for the two decade period 1980–1999. These are the journals that are indexed in the Social Science Citation Index (SSCI) database and they are

[1] Lominitz, L., Martha, W. & Cameo, L. (1987) Publication and referencing patterns in a Mexican research institute. *Social Studies of Science* **17**, 115–133.

[2] Lee Pao, M. (1992) Global and local collaborators: a study of scientific collaboration. *Information Processing and Management* **28**, 99–109.

[3] Narvaez, B.N. (1995) An index to measure the international collaboration of developing countries based on the participation of national institutions. *Scientometrics* **34**, 37–49.

[4] Hildrun, K. & Gupta, B.M. (1998) Collaboration Patterns in Theoretical Population Genetics. *Scientometrics* **43**, 455–462.

[5] Pruthi, S. & Nagpaul, P.S. (1993) Communication and productivity in scientific research. *Journal of Scientific & Industrial Research* **53**, 840–849.

[6] Uzun, A., Menard, A. & Ozel, M.E. (1993) Citation status of Turkish physics publications in foreign journals: A global analysis. *Scientometrics* **28**, 79–87.

assumed to be highly representative of the mainstream research activity in the field. (See Table IV for the list of journal titles).

We noted authorships by librarians and information scientists from DCs looking for articles, with the principle author or at least one co-author from all Central and South American countries, including Mexico, all African countries except the Republic of South Africa, all Middle Eastern countries except Israel, and all east and southeast Asian countries except Japan, South Korea, Singapore, and Hong Kong. Because of the poor facilities available to scientists in formerly socialist EECs, we also noted authorships by library and information scientists working in these countries.

Additionally, in an attempt to identify, the most active areas of research in LIS in the DC and EEC countries, we also noted the key words in the titles and the thematic noun phrases in the abstracts for all articles for the period 1996–1999 for which abstracts of articles were available in the SSCI. The counts of articles with DC or EEC authors presented in this work should be viewed as lower limits, for there are other journals, local or international, where library and information scientists can publish.

Findings

DCs and EECs in LIS research

One of the notable changes in the global research activity in LIS has been the decline in the publication output of library and information scientists in DCs and EECs in the 1990s. The number of countries contributing to research in LIS and the aggregated data on publication output for the five-year periods in 1980 to 1999 are given in Table I.

Table I

Numbers of DCs or EECs and their Articles in LIS (5-year totals for 1980–1999)

Year	Number of DCs/EECs with any articles	Number of articles	Mean number of articles/ country	Highest contributor
1980–1984	67	187	2·8	India
1985–1989	108	251	2·3	Nigeria
1990–1994	97	220	2·3	Nigeria
1995–1999	90	168	1·8	China

As the table indicates, the number of DCs or EECs, and their number of articles increased rapidly from 1980–1984 to 1985–1989, but decreased thereafter. Similarly, the average number of articles per DC or EEC decreased from 2·8 in 1980–1984 to 1·8 in 1995–1999. One can, of course, speculate arguments on the declining trends in publications, but further investigations need to be done to explore the reasons underlying the observed decline in the publication productivity. On the contrary, previous case studies by the author of the present paper show that the output of publications of some major DCs in hard sciences and social sciences have been increasing quite rapidly in the last decade.[7–10] Looking at the table it is also noticed that India started out as the leading contributor in 1980–1984, but was overtaken by Nigeria in 1985–1989. Nigeria enjoyed the leadership position until the mid 1990s, when China entered the scene taking the lead thereafter.

Contributions by individual countries

The distribution of articles with DCs and EECs authors, either principle or co-author, are given in Table II for the decades 1980–1989 and 1990–1999. The countries were identified and ranked on the basis of their total number of articles above a lower limit of 10 in 20 years or an average of one article every two years for 1980–1999.

It can easily be figured out from the data in Table II that Nigeria has the highest contribution accounting for 18·45% of the total number of 826 articles in the period 1980–1999. Articles from Nigeria, India, China, Saudi Arabia, Poland, Hungary, and Malaysia, the six DCs or EECs combined account for 53·1% of the total output. 57 countries are included in the *others* category, of which five are EECs, and 52 are DCs or CIS (Community of Independent States) countries having 16%, and 84% of the 171 articles (20·7% overall) in this category, respectively. Hence, on the aggregate, 15·1%, and 84·9% of the articles in LIS are from EECs, and DCs respectively, over the period 1980–1999.

The output and the share of India, Nigeria, and Poland in the total for 76 countries decreased in the intervening period between 1980–1989 and 1990–1999. In comparison, the output and the share of the following countries increased: China, Saudi Arabia, Malaysia, Turkey,

[7] Uzun, A. (1996) A bibliometric analysis of physics publications from Middle Eastern countries. *Scientometrics* **36**, 259–269.

[8] Uzun, A. (1998) A scientometric profile of social sciences research in Turkey. *International Information and Library Review* **30**, 169–184.

[9] Uzun, A. (2001) Publication output and national priorities in renewable energy. Regional World Renewable Energy Congress. 19–22 February Sharjah, United Arab Emirates, p. 385.

[10] Uzun, A. & Ozel, M.E. (1996) Publication patterns of Turkish astronomers. *Scientometrics* **37**, 159–169.

TABLE II

Publication Statistics of Individuals DCs and EECs in LIS

Country	Number of articles		Share in overall total (%)				
	1980–89	1990–99	Change (%)	1980–89	1990–99	Change (%)	Significant change
Nigeria	96	57	−41·0	21·5	15·0	−30·2	↓
India	75	36	−52·0	16·8	9·5	−43·5	↓
China	14	35	+150·0	3·1	9·2	+196·0	↑
S. Arabia	21	27	+28·6	4·7	7·1	+51·0	↑
Poland	33	7	−78·8	7·4	1·8	−75·7	↓
Hungary	20	18	−10·0	4·5	4·7	+4·4	0
Malaysia	12	14	+16·6	2·7	3·7	+37·0	↑
Turkey	8	12	+50·0	1·8	3·2	+77·7	↑
Yugoslavia	9	11	+22·2	2·0	2·9	+45·0	↑
Botswana	2	17	+750·0	0·4	4·5	+1000·2	↑
Ghana	2	16	+700·0	0·4	4·2	+895·0	↑
Pakistan	13	4	−69·2	2·9	1·0	−65·5	↓
Kuwait	6	10	+66·6	1·3	2·6	+100·0	↑
Mexico	8	7	−12·5	1·8	1·8	0·0	0
Brazil	8	6	−25·0	1·8	1·6	−11·2	0
Kenya	8	6	−25·0	1·8	1·6	−11·2	0
Taiwan	1	13	+1200·0	0·2	3·4	+1600·0	↑
Zambia	7	6	−14·3	1·6	1·6	0·0	0
Papua-New Guinea	5	5	0·0	1·1	1·3	+18·2	0
Sub total	348	307	−11·8	78·0	80·9	+3·7	0
Others	98	73	−25·5	22·0	19·1	−13·2	0
Total	446	380	−14·8	100·0	100·0	0·0	0

[1]See the Appendix for the names and the numbers of articles of the 57 countries included in this category.

Botswana, Ghana, Kuwait, and Taiwan. The corresponding figures for Hungary, Mexico, Brazil and Kenya remained fairly stable from 1980–1989 to 1990–1999.

However, on their own, the figures in Table II do not convey much information as they are confounded by the sizes of countries and/or their LIS communities. For example, India had many more articles than Saudi Arabia or Malaysia, but what inferences can we draw from these figures? Can we say that India gave more priority to LIS research than Saudi Arabia or Malaysia? As described below, the situation is just the opposite. Hence, we have computed an index, called the Activity Index (AI), for cross-national comparisons. This index was first proposed by Frame[11] and has subsequently been applied in research performance evaluations.[12] AI is defined as follows:

$$\mathrm{AI} = \frac{\text{the share of LIS articles in the country's publication output}}{\text{the share of LIS articles in the 76 countries' publication output}} \times 100.$$

AI computed in this way relates the research activities in LIS to internal reference standards within the countries and hence characterizes the relative research effort a country devotes to LIS research as reflected by the SSCI covered core journals. AI=100 indicates that the country's research activity in LIS corresponds precisely to the average of 76 countries; AI<100 indicates lower than average, AI>100 higher than average relative activity. We have used the following five-point scale for fixing the bench-marks suggested by Barre.[13]

Scale	Activity status
AI≤70	Low
70<AI≤90	Below average
90<AI≤110	Average
110<AI≤130	Above average
AI>130	High

[11] Frame, J.D. (1977) Mainstream research in Latin America and the Caribbean. *Interscience* **2**, 143–148.

[12] Schubert, A., Glanzel, W. & Braun, T. (1986) Relative indicators of publication output and citation impact of European physics research. *Czechoslovak Journal of Physics B* **36**, 126–129.

[13] Barre, R. (1987) A strategic assessment of scientific performance of five countries. *Science and Technology Studies* **5**, 32–38.

TABLE III

Countries Ranked by Research Activity Index (AI) in LIS, 1980–1999

Country	AI	Activity status
Botswana	340·3	High
Saudi Arabia	262·2	High
Ghana	237·2	High
Pakistan	230·2	High
Nigeria	222·4	High
Zambia	222·1	High
Kuwait	177·5	High
Malaysia	171·7	High
Papua-New Guiena	155·0	High
Yugoslavia	98·8	Average
Hungary	72·5	Below average
China	69·2	Low
Kenya	68·2	Low
Turkey	64·3	Low
Poland	63·6	Low
India	56·9	Low
Mexico	27·5	Low
Taiwan	18·6	Low
Brazil	13·6	Low

Computations for 1980–1999 show that AI is high in Nigeria, Saudi Arabia, Botswana, Kuwait, Papua-New Guinea, Pakistan, Ghana, Malaysia and Zambia while it is low in Brazil, China, India, Mexico, Poland, Taiwan, Turkey, and below average in Hungary (Table III). Yugoslavia is the only country with an AI value that corresponds almost precisely to the average of 76 countries (AI = 98·8). It is remarkable that when viewed regionally LIS research is receiving low priority in Latin America. Mexico and Brazil with high research activities in many areas of social sciences[14] ranked at the bottom of Table III whereas Latin American countries like Argentina, Chile, Colombia, and Venezuela each has fewer than 10 articles during the study period.

The Situation by Journals and Journal Preferences

The scatter of the 826 articles into 21 journals and the counts of DC or EEC articles in these journals are given in Table IV. We briefly note a few of the details that may be found through inspection of the table.

[14] Glanzel, W. (1996) A bibliometric approach to social sciences. National research performances in 6 selected social science areas, 1990–1992. *Scientometrics*, **35**, 291–307.

TABLE IV

Journals Ranked by the Number of Articles from DCs and EECs, 1980–1999

Journal	IF (1995)[1]	Country of origin	Total number of articles	Number of articles by DCs/EECs
Int. Inf. & Lib. Review[2]	0·075	UK	591	226
Libri	0·259	USA	429	143
J. Inf. Science	0·474	NET	641	91
Int. Forum on Inf. & Doc.	0·022	NET	634	86
Inf. Proc. & Management	0·580	UK	806	75
J. Am. Soc. for Inf. Sci	1·156	USA	1012	34
J. Educ. for Lib. & Inf. Sci.	0·241	USA	388	31
Educ. for Information	0·061	NET	206	27
Interlending & Doc. Supp.	0·242	UK	242	24
Lib. Acquis-Pract. & Theo	0·211	USA	648	19
J. Lib. & Inf. Science	0·278	UK	255	18
Bull. Medical Lib. Assoc.	0·673	USA	713	15
J. of Documentation	0·931	UK	264	15
Coll. & Res. Libraries	0·865	USA	640	6
Lib. & Inf. Sci. Research	0·594	USA	245	6
Inf. Tech. & Libraries[3]	0·163	USA	438	4
J. Academic Librarianship	0·439	USA	711	3
Lib Resour. & Tech. Serv.	0·468	USA	426	2
Library Quarterly	0·970	USA	240	1
Canadian J. Inf. & Lib. Sci.	0·130	CAN	152	0
Library Trends	0·208	USA	719	0
Total			10400	826

[1]IF of a journal is defined as the number of citations an average paper receives in the two years following its appearance in that journal.
[2]Preceding: International Library Review.
[3]Preceding: Journal of Library Automation.

First, the five journals ranked at the top of the table carry 621 articles (75·2%) and within this 369 articles (44·7%) went to two journals; International Information and Library Review (IILR), and International Journal of Libraries and Information Services (LIBRI), the premier journals for many library and information scientists working in DCs. The percentage of articles in 10 US journals including LIBRI is 31·9%. A further observation which is not shown in Table IV is that there has been a gradual shift in the preferences of DC and EEC authors from the journals of European origin to U.S. journals in recent years. Second, about 70% of all articles appeared in journals of relatively low citation impact (i.e. impact factors (IF) ranging between 0·022 and 0·278) (see the note to Table IV). Of course, impact factors of journals differ widely, not only from journal to journal within a particular field but also in time for the same journal in any field. A third observation comes by comparing the totals for the last two columns: Articles with authors from DCs or EECs account for only 7·9% of the total number of 10400 such articles published in 21 journals during the period considered. It is worth noting that this rate of contribution is somewhat lower than the rate of contribution of the same countries in several other fields.[15]

Research subjects

Assessing the subject profile of research in a field is probably the most problematic task in bibliometric data analysis.[16] Subject classification is generally based on journal assignment to subjects and problems arise from a broad range of topics covered by a journal.[17] In classifications of this type, several journals can be assigned simultaneously as contributing to two or sometimes more subjects.

In an attempt to gain some insight into the subject profile of research in LIS in DCs/EECs we followed an alternative approach. We tried to identify through the CD-ROM versions of the SSCI the key words and thematic noun phrases that occurred most frequently in the titles and abstracts in a sample of 102 articles from major countries given in Table II and Table III for the period 1996–1999. This effort resulted in a set of 16 key words or phrases with high frequencies of occurrence in the articles of the 10 out of 19 DCs/EECs listed in these tables. The

[15] White, J.C. (1992) Publication rates and trends in international collaborations for astronomers in developing countries, Eastern European countries, and the former Soviet Union. *Publications of the Astronomical Society of the Pacific* **104**, 472–476.

[16] Gupta, B.M., Sharma, S.C. & Mehrotra, N.N. (1990) Subject-based publication activity indicators for medicinal & aromatic plants research. *Scientometrics* **18**, 341–361.

[17] Dhruv, R., Gupta, B.M. & Kandhari, R. (1995) Collaboration in Indian physics: A case study of the macro and micro parametrization of sub-disciplines. *Scientometrics* **33**, 295–314.

articles from the remaining countries have shown no definite pattern in this respect. We grouped these key words/phrases on ad-hoc bases into eight broad classes as given below:

Bibliometrics;
Collection development-cataloging;
Information need-information use;
Information retrieval;
Librarians-librarianship-library professionals;
Libraries-library use-library and information services;
LIS education; and
Networking-library networking.

The results of the co-word analysis is given, in brief, in Table V where bibliometrics (including national trends in publications, journal and citation studies, author and institutional productivities, authorship and collaboration patterns, and the like) is the most frequent topic for LIS researchers in Botswana, China, Hungary, India, Malaysia, and Taiwan. Among these countries Botswana, Ghana, and Malaysia are also the countries where researchers seem to concentrate on information needs and information use.[18] Another observation comes by looking at the high areas of research activity in Nigeria where LIS education, libraries (i.e. academic libraries), library use, issues of librarianship and library professionals, receive high priority. A further finding is the relatively high interest in collection development and cataloging studies in Saudi Arabia. China is the only country where studies related to information resources, and networking in libraries occupy a dominant position in the research efforts in LIS.[19] This can be attributed, among other things, mainly to the size of China and the need for networking in a large number of libraries scattered throughout the country often with collections of hundred thousands of documents.[20]

Conclusion

A comparative analysis of the contributions of DCs and EECs in world LIS research, particularly the identification of the topics of high activity

[18] Majid, S., Anwar, A.M. & Eisenschitz, T.S. (2000) Information needs and information seeking behavior of agricultural scientists in Malaysia. *Library & Information Science Research*, **22**, 145–163.

[19] Gong, Y.T. (1996) The initial development of networking in Chinese libraries. *Journal of Information Science*, **22**, 462–466.

[20] Meng, G.J. & Wang, B. (1996) The library and information system of the Chinese Academy-of-Sciences. *International Journal of Libraries and Information Services*, **46**, 52–58.

TABLE V

Most Frequently Occurring Key Words/Phrases in LIS Articles by Major DCs/EECs, 1996–1999

Country	Biblio[1]	Coll/cat.	Inf.need/use	Inf.ret	Librarians	Libraries	LIS edu	Networking
Botswana	√		√					
China	√							√
Ghana			√					
Hungary	√							
India	√			√				
Saudi Arabia		√				√		
Malaysia	√		√					
Nigeria					√	√	√	
Taiwan	√			√				
Turkey				√				

[1]Biblio: Bibliometrics. Coll/cat: Collection development-catalonging, Inf.need/use: Information use, Librarians: Librarians - library professionals - librarianship. Libraries - library use - library and information services. LIS edu: LIS education. Networking: Networking-library networking.

has important implications for strategic planning in research and research policy in these countries. The results of the co-word analysis indicate that in major countries such as India, China, and Hungary there is higher interest in information-science oriented subjects, i.e., bibliometrics/scientometrics/informetrics, information retrieval, information systems and networking in libraries. It also emerges that researchers working in many countries in Africa and Asia concentrate mainly on topics related to libraries, library professionals, LIS education, and issues on librarianship. The results also suggest that there exist substantial activities related to collection development, cataloging, library automation and library services in Middle Eastern and Arab countries in particular.

It is hoped that the framework and analytical approach presented in this work may provide an effective tool to research planners in DCs and EECs not only in assessing and monitoring their developments in research but also helping them in identifying their gaps and weaknesses.

Data in studies of this type can be collected fairly easily at different levels of breakdown of fields into research topics and are also amenable to crossnational comparisons. Finally, the need for additional case studies in this context is noted for the purpose of uncovering national as well as regional characteristics of research activities in LIS in DCs and EECs.

Appendix

Countries each having less than 10 articles in LIS, 1980–1996

Country	Number of articles
Algeria	2
Argentina	4
Bahrain	6
Bangladesh	6
Bulgaria	8
Byelarus	4
Chile	7
Croatia	9
Costa-Rica	1
Cuba	2
Cyprus	1
Czech Republic	8
Dominican Republic	1
Ecuador	1
Egypt	5
Ethiopia	6
Fiji	1

APPENDIX
Continued

Country	Number of articles
GDR	7
Indonesia	2
Iran	5
Iraq	1
Ivory-Coast	1
Jamaica	6
Jordan	2
Latvia	1
Libya	4
Lithuania	2
Khazakhistan	1
Madagascar	1
Malawi	1
Mali	1
Malta	1
Nicaragua	1
Namibia	1
Nepal	1
Oman	1
Paraguay	1
Peru	1
Philippines	7
Qatar	2
Romania	3
Russia	9
Senegal	1
Slovakia	1
Slovenia	2
Sierra-Leone	1
Sri-Lanka	1
Syria	1
Tanzania	6
Thailand	6
Trinidad & Tobacco	7
Tunisia	1
Uganda	3
United Arab Emirates	1
Uruguay	3
Venezuela	1
Zimbabwe	1