

Scatter of Indian Mathematicians' Contributions in Primary Periodicals

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A rank list of periodicals on the basis of the contributions of Indian Mathematicians has been prepared from the issues of *Mathematical Reviews* vols 57 and 58 1977. The study reveals the publishing trend of the Indian Mathematicians in different countries' journals; and it also indicates some guidelines of journal selection policy. The data of *Mathematical Reviews* 1977 have been compared with those of *Mathematical Reviews* 1965 to show the changing trend of Indian Mathematicians to publish their contributions in foreign periodicals. How to determine the cut-off point in the rank list from the acquisition points of view has been discussed.

Introduction

Periodicals act as medium for the communication of ideas, exchange of experience and transmission of current information. Mostly new discoveries and novel ideas first appear as periodical articles. A large number of these articles may not subsequently be included in any other form of communication media. In view of this, the periodicals collection is to be professionally processed and organised.

The ever increasing trend in number of scientific periodicals, their subscription rates, and space needed for storing is compelling libraries to select only those periodicals which are of reasonably higher relevance to the target users' field of interest.

The libraries usually follow one or more of the following techniques in making their selections (1) recommendations by experts, (2) notes and reviews, (3) recommendation

by the librarians on the basis of (a) ranking of periodicals according to their frequency of citations, (b) use statistics from domestic points of view and (c) ranking of the periodicals on the basis of the contribution of Indian Scientists. The present study is an attempt based on the last technique in the field of Mathematical Sciences.

An endeavour has been taken to analyse the extent of scatter of contribution of Indian Mathematicians in both the Foreign and Indian Periodicals. The aim of the study is to reveal : (i) publishing trend of Indian Mathematicians, (ii) country-wise distribution of publishing articles by the Indian Mathematicians and (iii) some guidelines of journal selection policy based on (i) and (ii).

Scope and limitations

The present study confines itself within the citations as referred by the *Mathematical Reviews* (MR) only. The rank list of periodicals thus produced will be production oriented irrespective of their quality. It excludes any additional policy decisions that might come out from the analysis of the citations made by the Indian Mathematicians themselves at the end of their original contributions.

Data collection

Issues of MR vols 57 & 58, 1979 have been taken as our source document for the study. Data regarding the articles contributed by the Indian authors both singly and also jointly either by themselves or with their foreign colleagues, as reviewed in MR are collected and featured in the adjoining tables after necessary computations there on. For the information regarding the country of origin we have consulted the list given in the index volume of the MR itself and the Ulrich's International Periodicals Directory in some instances. Indian names with foreign citizenship could not be identified in the study.

Muslim surnames of Indic origin could hardly be differentiated from those of foreign origin.

(a) Foreign periodicals containing Indian contributions

A rank list of foreign periodicals in the decreasing order of the contribution of Indian Mathematicians has been prepared. It features the important foreign periodicals in mathematical sciences and corresponding number of Indian contributions published there in (as reviewed in MR V. 57 and 58, 1979).

It is a list of 288 periodicals in total (Table-1). Only 23 periodicals containing 8 or more than 8 articles have been enlisted with their rank order, title, country of origin, and number of articles. The data regarding the remaining 225 periodicals containing 7 or less than 7 articles are abridged there under. Instead of individual entry, number of periodicals with the number of articles only are mentioned against the corresponding rank order.

288 foreign periodicals published from 41 countries (vide table-1) contained 940 India contributions which is little above 55% of total Indian contributions.

(b) Country-wise distribution of publishing Indian contributions

288 foreign periodicals containing the contributions of the Indian Mathematicians are published from 43 foreign countries, beside 37 periodicals published from India. Foreign countries are arranged in the decreasing order of their output (yearly cumulated) in table 2. In the same table total number of source journals bearing Indian contributions is also given.

It is evident from table-2, that the Indian Mathematicians have preferred American, British, German, and Romanian periodicals (in decreasing order) to publish their contributions. Or in otherwords, their work is getting recognition in these European countries from their professional colleagues.

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Table 1: Rank list of foreign periodicals (as cited in Math Rev vols 57 & 58, 1970)

Sl. No.	Rank (n)	Title	Country	Absolute No of Articles (N)	Cumulated of Articles ($\sum N_i$)	% of N_i in respect of Total ($\sum N$)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	1	Bull Math Sci Math RS Roumainie (NS)	Romania	83	83	2.4
2.	2	Atti Accad Naz Lincei Rend Cl Sci Fis Mat Nature	Italy	22	45	4.7
3.	3	J Math Anal Appl	USA	19	64	6.8
4.		Z Wahr Sch Verw Gebiete	G DR	19	83	8.8
5.	4	Int J Syst Sci	Gt Brit	17	100	10.6
6.	5	Kyungpook Math J	S Korea	15	115	12.2
7.		Proc Amer Math Soc	USA	15	130	13.8
8.	6	IEEE Trans Automatic Control	USA	13	143	15.2
9.		IEEE Trans Computers	USA	13	156	16.5
10.	7	J Phys A	Gt Brit	12	168	17.8
11.		Mathematica	Romania	12	180	19.1
12.		Rev Roumaine Math Pures Appl	Romania	12	192	20.4
13.	8	IEEE Trans Circuit & Syst	USA	11	203	21.5
14.	9	J Lond Math Soc	Gt Brit	10	213	22.6
15.		Math Sem Notes Kobe Univ	Japan	10	223	23.7
16.		Phys Rev D	USA	10	233	24.7
17.		Publ Inst Math	Yugoslavia	10	243	25.8
18.	10	Labedev J Sci Tech Pt. A	Pakistan	9	252	26.8
19.		Math Balkanica	Yugoslavia	9	261	27.7
20.	11	Biometrika	Gt Brit	8	269	28.6
21.		Gen Relativity & Gravitation	Gt Brit	8	277	29.4
22.		Int J Control	Gt Brit	8	285	30.3
23.		J Approx Theory	USA	8	293	31.1
24-35	12	12 journals	USA	7 = 84	397	40.1
36-48	13	13 "	13 X 6 = 78	455	48.4	
49-62	14	14 "	14 X 5 = 70	525	55.8	
63-83	15	21 "	21 X 4 = 84	609	64.7	
84-121	16	38 "	38 X 3 = 114	723	76.9	
122-171	17	50 "	50 X 2 = 100	823	87.5	
172-288	18	117 "	117 X 1 = 117	940	100.0	

Table-2: Country-wise distribution of primary host journals and no. of contributions by Indian Mathematicians (ranked in the decreasing order of article production)

Sl no	Country of origin	No of host Jr	Cumul no of articles	In % of Total articles
(1)	(2)	(3)	(4)	(5)
1	USA	81	289	17.7
2	Gt Brit	29	102	6.02
3	GDR	16	63	3.7
4	Romania	9	63	3.7
5	Japan	13	44	2.5
6	Italy	12	43	2.5
7	Netherland	20	42	2.4
8	Yugoslavia	5	32	1.9
9	Poland	13	28	1.6
10	Hungary	6	22	1.2
11	Belgium	6	19	1.1
12	Poland	9	18	1.07
13	Turkey	4	17	1.0
14	Canada	4	16	0.9
15	S Korea	1	15	0.8
16	Australia	5	14	0.8
17	Pakistan	2	11	0.6
18	Taiwan	2	11	0.6
19	Switzerland	7	10	0.5
20	USSR	7	10	0.5
21	France	6	10	0.5
22	Spain	3	10	0.5
23	Czechoslovakia	3	6	0.3
24	Austria	3	5	0.2
25	Zaire	1	5	0.2
26	FRG	3	4	0.2
27	Sweden	2	4	0.2
28	Bulgaria	1	3	0.1
29	S Africa	1	3	0.1
30	Denmark	1	3	0.1
31	Nepal	1	3	0.1
32	N Zealand	1	3	0.1
33	Israel	1	3	0.1
34	Greece	1	3	0.1
35	Venezuela	1	2	0.1
36	Bangladesh	1	2	0.1
37	Mexico	1	2	0.1
38	Malayasia	1	1	0.05
39	Argentina	1	1	0.05
40	Mozambique	1	1	0.05
41	Portugal	1	1	0.05
42	Libya	1	1	0.05
43	Finland	1	1	0.05
44	India	37	753	44
(Total)				
44		325	1693	100
Countries		Journals Articles		

The periodicals belonging to USA and Great Britain, published about 17.7% and 6.02% of Indian Mathematics literature respectively which is in other words equivalent to 30.7% and 10.8% respectively of the literatures published in foreign periodicals. Periodicals of Indian origin published 45% of the total Indian Mathematics literature throughout the year. The foregoing facts also confirm the preferential choice of countries of the Indian Mathematicians.

Table-3: Indian Mathematicians abroad registrants² as on 1.1.82

Country	Total entrant	Total Returned
USA	352	128
UK	114	55
Canada	56	17
W Germany	19	9
OE C	45	28
ANZ	8	4
Others	33	14
Total	627	255

OE C=Other European Countries ANZ=Australia and New-Zealand

The table-3 showing the country-wise distribution of Indian Mathematicians going abroad for purposes of higher study or employment also confirms significantly their preference in choosing the countries for publishing their articles and vice versa.

(c) *Indian periodicals containing Indian contribution*

A rank list of Indian periodicals containing the contribution of Indian Mathematicians has been prepared. The outcome is a list of 37 Indian periodicals which contain 753 Indian contributions (Table 4). This is equivalent to

45% of the total contributions by the Indian mathematicians during the year.

(d) *Regarding authorship*

The analysis of the raw data of the total 1693 articles reveals that 1192 articles are contributed by Indian authors singly, 363 by two Indian authors jointly, 27 by more than two Indian authors; and 111 by Indian authors jointly with foreign authors.

Comparative study MR 1965/1979

In order to find out whether there has been any increasing or decreasing trend on the part of the Indian Mathematicians to publish their contributions in the foreign periodicals, we have compared the data collected by us from the issues of Math Rev 1979 with those of Math Rev 1965 collected by Peter and Rajagopalan¹ of Insdoc.

The MR 1979 shows that the foreign periodicals contain 55% Indian contribution in regard to total contributions of Indian Mathematicians while the MR 1965 reports the same as 62%. It is apparently seen that the Indians may have no more preference to get their articles published in foreign journals as the Indian journals in this field are now of comparative standard to those of foreign ones. In this context, it may be pointed out that the similar type of comparative studies done so far in other fields of physical and biological sciences show mostly the increasing tendency of publishing Indian articles in foreign periodicals. Surprisingly our comparative study reveals the decreasing tendency in this regard—a reverse trend indeed.

Whether the practice of Indian scientists publishing their contributions in foreign periodicals is a healthy trend or not or whether it should be discouraged in order to encourage our scientific periodicals deserve many considerations. There are various reasons for this scattering of Indian contributions in foreign

Table-4: Rank list of Indian Periodicals (as cited in Math Rev V.57 & 58, 1979)

Sl. No.	Rank	Title	No of articles	No of articles cumulated	% of Total
(1)	(2)	(3)	(4)	(5)	(6)
1	1	Ind J Pure Appl Math	249	249	33
2	2	Sankhya Ser B	50	299	39
3	3	J Math & Phys Sci	45	344	45.8
4	4	Ind J Hist Sci	39	383	50.8
5	5	Sankhya Ser A	36	419	55.6
6	6	Acta Cienc Indica	29	448	59.4
7		Vidya	29	477	63.3
8	7	Jnabha Sect A	27	504	66.9
9	8	Pure Appl Math Sci	24	528	70.1
10	9	Bull Cal Math Soc	19	547	72.6
11		J Math Sci	19	566	75.1
12		Ranchi Univ Math J	19	585	77.6
13	10	Cal Stat Assn Bull	15	600	79.6
14		J Ind Math Soc (NS)	15	615	81.6
15	11	Proc Nat Acad Sci India A	14	629	83.5
16	12	Ganita	13	642	85.2
17		J Ind Instt Sci	13	655	86.9
18		Progr Math	13	668	88.7
19	13	Proc Ind Nat Sci Acad Pt A	12	680	90.3
20	14	Vijnana Parishad Anushandhan Patrika	11	691	
21	15	Math Educn	10	701	
22	16	Vikram	7	708	
23	17	Defence Sc J	8	714	
24	18	J Shivaji Univ (Sci)	4	718	
25		Math Student	4	722	
26		Pramana	4	726	
27		Vijnana Bharati	4	730	
28	19	Ind J Mech Math	3	733	
29		J Comb Inform Syst Sci	3	736	
30		J Ind Statist Assn	3	739	
31		J Karnatak Univ Sci	3	742	
32		J Madurai Kamraj Univ	3	745	
33		Opsearch	3	748	
34	20	J Tech Bengal Engg College	2	750	
35-37	21	3 journals	1 each	753	
(Total)					
37 titles				783 articles	65% of total

periodicals. One of them is that the worth and position of Indian scientists is generally estimated by their publication in foreign periodicals.

Determination of cut-off point in the rank list

Within the financial limitations, the libraries have to determine the cut-off point in the rank list of periodicals on the core subject from the acquisition point of view.

After having done some mathematical calculations on our survey results, it has been revealed that if we select foreign periodicals upto 10th and Indian periodicals upto 12th rank we can cover 55.16% of the total number of articles on the subject. Ultimately, the foreign periodicals thus selected will cover

Table 5. Comparison of publishing trend of Indian Mathematicians

Source document for data	No of articles published in	No of host Journal	Remarks
Indian Jr	277	24	% of Indian contribution in foreign Jr = 62
Math Rev Foreign Jr 1965	452	141	
Total	729	165	
Indian Jr	753	37	% of Indian contribution in foreign Jr = 55
Math Rev Foreign Jr 1979	940	288	
Total	1693	325	

15% of the total Indian contribution (26.8% of the contribution in foreign periodicals) and Indian periodicals will cover 40.16% of the total contribution (90.3% of the contributions in Indian periodicals). These calculations in other words indicate first 17 foreign periodicals out of 288 total foreign periodicals plus 19 Indian periodicals out of 37 titles (i. e. 11% of the total number of periodicals featured).

A careful survey of citations made by the Indian mathematicians (sample size 25 articles) also justifies the fact that 36 periodicals thus chosen come in the rank order either in the core or the nearby zones.

Conclusion

1. The study indicates a declining preference of the Indian Mathematicians to get their contributions published in foreign journals and place greater reliance on Indian journals. This trend is in contrast to other fields of physical and biological sciences wherein similar studies show mostly an increasing tendency of publishing Indian articles in foreign periodicals.

2. A cut-off point in the rank list suggests 17 foreign and 19 Indian periodicals as significant titles for the Indian Mathematicians, and may be considered for journals subscriptions by the libraries dealing with the subject.

3. However, financial limitations, domestic use pattern and the local ILL facilities are a few among the factors that are to be thought of when deciding on journal subscription.

4. Languages of the text are also to be considered. For example, the languages in which domestic translation service is not available should preferably be avoided from subscribing. We may, instead, ask for a cover to cover translation from some other authorised agencies.

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