

## AN APPROACH FOR SELECTION OF JOURNALS IN LIBRARIES OF R&D INSTITUTIONS

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*Considering the conventional approach for selection of journals based on ranking through bibliographical countings not entirely suitable for libraries of R&D organizations, a use-based selection process which seems to be more systematic and cost effective for such organizations has been reported.*

### INTRODUCTION

S&T journals are indispensable resource for a library of any R&D organisation as they play a pivotal role in the communication channel and as such most of the libraries of such organisations spend the bulk of the budget for purchase of journals. However, during the recent years many of these libraries are facing a financial crunch as the cost of the journals is increasing every year disproportionate to the library budget (1-7). Further, the libraries of the organizations embarking on new R&D programmes are required to subscribe new journals in specific areas. In such a situation, the libraries need to review their acquisition policy regularly and subscribe the journals having more relevance to the activities of the organizations. The usual way to know the relative importance of a journal is to see its rank among the titles in a certain discipline of science based on citation studies. A large number of such studies on journals of various disciplines have been done in India (8-18). Rating of journals through citation counts, though undoubtedly a rational and logistic way, has some limitations in the selection of journals for the R&D organisations. It is because, the R&D organisations mostly have to perform highly applied research in micro areas which are often poorly cited in conventional journals due to various reasons. So the selection of journals solely based on citation studies may not always satisfy the information needs of the R&D community effectively. Further, the utility of journals ranking high in bibliographic citation may

wane because of the shift of R&D work and emergence of new journals.

With this view, a different approach is followed for selection of foreign journals for the library of the Regional Research Laboratory, Jorhat. The laboratory is primarily engaged in multidisciplinary applied research. Like any other R&D organisation in India, the S&T personnel of the laboratory heavily depends on foreign S&T journals for information needs. The annual inflation in price of the journals over the years has been severely affecting the acquisition programme of the library. The library on an average has to delete three titles every year to contain the mounting expenditure. Currently the library has arrived at an alarming situation as the cost of the pound sterling, US dollar and DM, the commonly used foreign currencies have registered a rise of about 27%, 41% and 16% respectively. In view of the soaring rates of subscription of journals and conversion rates of exchange vis-a-vis stringent budgetary constraints, the library has to review its journal acquisition policy thoroughly and size up the subscription list of journals to match the library budget. For this purpose a utility oriented approach for selection of journals in the library as described below was applied.

### MATERIALS AND METHODS

A total of three hundred and one titles were subscribed by the library in the year 1991. Out of which 109 titles were Indian and 15 titles both of Indian and foreign origin were received free of cost. The rest 177 titles were subscribed from foreign countries. The Indian titles were excluded from the study as all the Indian Journals under subscription were decided to be continued. Out of the 177 titles of foreign origin, 11 titles which were abstracting or review publications were also excluded from the study as they were considered

Table 1  
Rank List of Organic Chemistry Journals and its Comparison with other Rank Lists

Sl. No.	Title of Journal	s	b	c x 4	p x 8	U <sub>i</sub>	Earlier Rankings according to Singh M (1978)	Singh R S (1974)
		d	- x 2				1967	1976
1.	Tetrahedron Letter	8,575	4,550	300	24	337,125	8	3
2.	J Organic Chemistry	4,000	19,600	232	16	271,600	3	4
3.	Heterocycles	3,357	1,143	100	40	144,500	-	5
4.	Tetrahedron	5,750	2,000	136	0	143,750	14	-
5.	Synthesis	5,900	9,800	120	8	143,700	-	158
6.	J Heterocyclic Chemistry	1,625	3,750	124	0	129,375	77	19
7.	Chemistry & Industry	3,103	1,931	40	64	109,340	10	21
8.	J Medicinal Chemistry	1,875	0,250	100	0	102,125	71	26
9.	Chemical Communication	6,375	1,833	68	16	92,208	26	6
10.	Phytochemistry	4,000	0,706	56	0	60,706	91	30
11.	Planta Medica	3,200	5,600	48	0	56,800	-	-
12.	Perkins Transaction, I	2,429	0,571	48	0	51,000	-	-
13.	J Natural Products	1,700	0,400	44	0	46,100	-	19
14.	Canadian J Chemistry	2,167	0,667	28	0	30,834	19	-
15.	Chemistry Letters	4,538	2,154	20	0	26,692	-	-
16.	Chemical Society Review	1,000	5,000	12	0	18,000	-	165
17.	J Pharmaceutical Science	1,125	0,000	16	0	17,125	-	26
18.	Chemical Review	3,222	1,556	12	0	16,778	-	-
19.	Accounts of Chemical Research	1,600	2,000	8	0	11,600	-	-
20.	J Agricultural & Food Chemistry	2,500	0,040	0	8	10,540	-	-
21.	Perkins Transaction, II	3,500	0,333	0	0	3,833	-	-

s = number of users who signed on the slip during display,  
d = number of issues of the titles received and displayed,  
b = number of borrowers who were issued the displayed journals,  
c = number of citations given in papers submitted for publication to the titles under study,  
p = number of papers published in the titles under study.

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essential for procurement. Rest of the foreign titles were considered for ranking according to their use pattern in the following ways.

The readership assessment of 1396 issues of 166 foreign titles received in the library from February 1, 1990 to 31st August 1991 was made during their display. A slip signed for this purpose, was attached to each issue of the journal selected for the display inside the cover page requesting the user to put his signature after the use of the issue. The issues of the journals were kept on a display table for three days and then transferred to the allotted pigeon holes with a slip still inside the issue so that the users could record their use even if they missed it on the display table. On 1st September 1991 the issues were removed and the signatures were noted.

The issue slips received from the R&D staff for overnight loan of the issues of the journals during the period of study were preserved and were counted to make the assessment of readership.

The citations appended in 111 research papers submitted for publication during the period under study by the R&D staff of the laboratory were analysed and the citations to each of the foreign journals under subscription were analysed.

The research papers published by the scientists from the laboratory in each of these journals were counted.

**USAGE**

The four countings for each of the journals were computed using the following formula specifically for the purpose to get the utility ( $U_i$ ) for each journal.

$$U_i = \frac{b}{d} X 1 + c X 2 + p X 4 + X 8$$

$b$  = number of users of issues of the journals received and displayed during the period of study,

$d$  = number of issues of the journals received and displayed.

$b$  = number of borrowers of issues of journals received and displayed,

$c$  = number of citations in the papers submitted for publication from the laboratory in the foreign journals under consideration

$p$  = number of papers published in the foreign journals under consideration.

and 1,2,4, and 8 are the weightages applied. The journals were then grouped disciplinewise and arranged in sequence of use factor.

No weightage was given to the method of counting the signature during display as many of the scientists read the displayed journals desultorily and often browse the journals not falling necessarily under their own disciplines/functional areas/specializations. Still browsing of journals is important as it keeps the scientists aware of the current developments in diverse fields and helps in generation of new ideas. On the contrary, the borrowing of journals for overnight use reflects a more genuine readership of the journal. Such journals are definitely more essential than the journals seen by the readers casually during display and therefore, the counting of borrowed journals was given double the weightage of the former.

Research papers are the final outcome of the R&D work carried out in a particular discipline (barring R&D work where publications are prohibited to avoid interference with marketing of process/products or contractual obligations). A higher weightage of 4 was given to those journals which were cited by the scientists in their papers than those used for borrowing. It is widely accepted that a cited article is usually somewhat relevant to the research reported in the citing article and the cited papers are not only definitely used by the citing authors but also the journals bearing such articles represent the area of work of the citing authors. Therefore, the frequency with which a particular journal is cited would provide a quantitative measure of the utility of the journal.

"A journal usually represents distinct niche of science covering one or more topic areas within a

Table 2

Rank List of Biochemistry Journals and its Comparison with other Rank Lists

Sl. No.	Title of Journal	s -d	b -x2 d	c x 4	p x 8	U <sub>i</sub>	Ranking according to Sengupta's Microbiol Journal (1989)	Sengupta's Biochem Journal (1973)
1.	Biotechnology and Bioengineering	3.455	0.000	124	0	127.455	66	-
2.	J Biological Chemistry	1.000	0.000	56	0	57.000	8	1
3.	Agricultural & Biological Chemistry	1.000	0.000	28	0	30.727	-	-
4.	J Fermentation & Bioengineering	2.765	0.118	16	0	18.833	-	-
5.	Applied Microbiology & Biotechnology	2.067	0.533	16	0	18.600	7	3
6.	Biochemica et Biophysica Acta	1.333	0.000	16	0	17.333	17	10
7.	Archives of Biochemistry & Biophysics	1.087	0.000	16	0	17.087	-	-
8.	Enzym & Microbial Technology	3.429	0.571	4	8	16.000	18	-
9.	Canadian J of Microbiology	2.167	1.000	12	0	15.167	-	-
10.	Antonie Van Leeuwenhoek	2.600	0.200	12	0	14.800	21	-
11.	Archives of Microbiology	2.200	0.200	12	0	14.400	71	-
12.	Folia Microbiologia	2.200	0.000	12	0	14.200	48	-
13.	J Applied Bacteriology	1.615	0.154	8	0	9.769	15	8
14.	Biochemical Journal	0.808	0.000	8	0	8.808	78	-
15.	J General & Applied Microbiology	2.400	0.000	4	0	6.400	-	-
16.	Geomicrobiology Journal	1.000	2.000	0	0	3.000	-	-
17.	Process Biochemistry	2.000	0.400	0	0	2.400	-	-
18.	Plant & Soil	1.455	0.182	0	0	1.637	-	-

Table 3  
Rank List of Geoscience Journals and its Comparison with other Rank Lists

Sl. No.	Title of Journal	s d	b -x2 d	c x 4	p x 8	U <sub>i</sub>	Earlier Ranks according to Pravathamma, Nijagunappa, (1991)	Earlier Ranks according to (1985)
1.	Tectonophysics	0.419	0.516	92	0	92.935	7	10
2.	Seismological Soc. of America Bull	2.000	8.000	44	0	54.000	-	-
3.	Geological Soc of America Bull	0.889	0.222	32	0	33.111	6	4
4.	J Geophysical Research	1.200	1.200	28	0	30.400	18	22
5.	American Assoc Petroleum Geologist Bull	0.461	1.000	12	0	13.461	26	19
6.	Mineraleum Deposita	1.000	12.000	0	0	13.000	-	-
7.	Geophysical Journal International	1.000	2.000	8	0	11.000	-	-
8.	Physics of the Earth & Planetary Interior	0.615	0.308	4	0	4.923	-	-
9.	Izvestia-Physics of the Solid Earth	0.000	0.000	4	0	4.000	-	-
10.	Seismological Research Letter	0.500	3.500	0	0	4.000	-	-
11.	Economic Geology	0.500	1.667	0	0	4.000	-	-
12.	Earthquake & Volcano	1.286	0.857	0	0	2.167	4	14
13.	Geochemica et Cosmochemica Acta	0.643	0.857	0	0	2.143	-	-
14.	J Petrology	0.750	0.500	0	0	1.500	8	7
15.	Bull International Seismological Centre	0.308	0.154	0	0	1.250	16	21

scientific discipline". A journal, therefore, publishes only those papers which fall under its topical area/areas. Further, normally the scientists also prefer to publish their work in reputed core journals to disseminate the research to wider peers. Therefore, highest weightage of 8 was given to those journals wherein research work of the scientists from the laboratory was published, as these journals were considered to be the most preferred journals for the scientists.

#### DISCUSSION

Though 166 foreign journals serving twelve disciplines/functional areas were covered, yet the discussion is confined to 72 journals serving four major disciplines, viz., organic chemistry, biochemistry, geoscience and inorganic chemistry. The journals covered under each discipline arranged in order of their use factor ( $U_i$ ) are presented in Tables 1,2,3 and 4 respectively. The rankings of journals in the first three areas by other workers are also presented alongwith to facilitate the comparison. The utilization of ten other multidisciplinary/popular journals subscribed to serve the diverse interest is shown in Table-5.

From the tables 1-4 it is seen that as compared to the geoscience and inorganic chemistry journals the organic chemistry journals were more used. The incidence of higher  $U_i$  in these two groups of journals were mainly due to higher rate of citations from these journals by the scientists from both the disciplines.

The library subscribed to 21 journals core to the field of organic chemistry (Table-1) and during 1990 and 1991 in seven of these journals 22 papers were published and 378 citations from 19 of them were cited in papers submitted for publication by the scientists during February 1990 to August 1991. The journals mostly used for publication of papers were Chemistry & Industry, Heterocycles, Tetrahedron Letter, Chemical Communication and Journal of Organic Chemistry. Another four journals used for publication of their work were Perkins Transaction-I, Phytochemistry, Journal of Heterocyclic Chemistry and Tetrahedron in which 3,3,5 and 7 papers were published in the respective order during the earlier five years (1985-1989). Tetrahedron Letter was the most cited journal followed by Journal of Organic Chemistry. The higher  $U_i$  recorded for the

first 15 journals indicated that these journals were very essential for the R&D work in organic chemistry and their deletion will be detrimental. The last five journals are comparatively less useful and can be considered for deletion if funds do permit.

In Biochemistry (Table-2) out of 18 journals subscribed only one journal published one paper during 1990-91 whereas 15 journals were cited by the scientists in their papers submitted for publication during the period under study. Biotechnology & Bioengineering was the most cited journal and 31 citations to this journal were in the papers submitted for publication by the scientists followed by Journal of Biological Chemistry with 14 citations. The  $U_i$ s of these journals were low as compared to those of the organic chemistry journals because less number of papers were published in these journals. In geoscience journals (Table-3) no paper was published but 8 of the journals were cited by the scientists and Tectonophysics with 23 citations topped the list of 15 journals. Under inorganic chemistry journals are listed, based on functional areas. However, most of the journals represent microareas/subdisciplines falling under organic chemistry. In these journals only two papers were published in Cement & Concrete Research and the rest in J Thermal Analysis were published but only to six citations were given from eight journals. Most of the geoscience and inorganic chemistry journals were of low  $U_i$  because these journals were either poorly cited and/or very few papers were published in these journals. The comparatively low  $U_i$  of the journals in biochemistry, geoscience and inorganic chemistry denote that these are less useful and dispensable to meet the budgetary constraints some of the journals towards the bottom of the list are considered for deletion.

Of the ten journals listed under general chemistry (Table-5), five were cited by the scientists in seven disciplines of the laboratory. The number of 12 citations were from Nature followed by Chemtech (10 citations) and Science (8 citations). In none of the journals papers were published but barring one journal all were highly browsed during display and loan.

A comparison of the rankings of journals in each discipline with those by the other

Table 4  
Rank List of Inorganic Chemistry Journals and its Comparison with other Rank Lists

Sl. No.	Title of Journal	s d	b -x2 d	c x 4	p x 8	U <sub>i</sub>	Singh M 1967	Earlier Ranks according to (1978) Singh R S (1974) 1976
1.	J Thermal Analysis	0.571	0.000	24	8	32.571	-	-
2.	Cement & Concret Research	1.750	2.000	16	8	27.750	-	-
3.	J Petroleum Technology	0.000	1.250	24	0	25.250	-	-
4.	Separation Science & Technology	2.000	0.769	12	0	14.769	-	118
5.	Oil & Gas Journal	0.530	0.121	12	0	12.651	-	-
6.	Inorganic Chemistry	2.368	0.211	8	0	10.579	18	15
7.	American Ceramic Society Journal	1.500	2.500	4	0	8.000	-	-
8.	American Ceramic Society Bulletin	1.300	0.200	4	0	5.500	-	-
9.	Zeolite	1.000	4.000	0	0	5.000	-	-
10.	Adv Cement Research	2.333	1.333	0	0	3.666	-	-
11.	SPE Reservoir Engineering	0.750	1.500	0	0	2.225	-	-
12.	SPE Production Engineering	0.000	2.000	0	0	2.000	-	-
13.	Applied Clay Science	1.000	0.667	0	0	1.667	-	-
14.	World Cement	0.737	0.730	0	0	1.467	-	-
15.	Catalysis Review	0.400	0.800	0	0	1.200	-	-
16.	J Canadian Petroleum Technology	0.500	0.000	0	0	0.500	-	-
17.	SPE Formation Evaluation	0.500	0.000	0	0	0.500	-	-
18.	SPE Drilling Engineering	0.000	0.000	0	0	0.000	-	-

reveals that in organic chemistry nine of the subscribed journals occupying 1st, 2nd, 4th, 6th, 7th, 10th, 14th, 17th and 18th position also find place in the ranking of 219 journals done by Singh [18] who ranked the periodicals in chemistry from the point of view of Indian scientists. Of the nine journals from the present list, six appeared at one or the other place from 4th to 26th ranks in his list of journals. Similarly nine of the journals occupying the positions between 1 to 14 were also found in the rank list of thirty journals prepared by Singh [17] based on the study of Chemical Review for the year 1976. The Tetrahedron Letter, J Organic Chemistry and Tetrahedron which were ranked 1st, 2nd and 4th based on U, also occupied 9th, 5th and 4th positions respectively in the R.S. Singh's list [18] and 3rd, 4th and 5th positions in the M.Singh's list [17]. This shows that in organic chemistry the rankings in the present study more or less conform to the rankings done by others through citation analysis in two different base journals in national and international context. This means that the nature of work done in the Organic Chemistry Division of the laboratory is highly basic in nature and the journals occupying the higher ranks in these lists mostly publish basic works which are highly cited.

In the field of biochemistry (including microbiology), Biotechnology & Bioengineering, J Biological Chemistry, Agricultural & Biological Chemistry, J Fermentation & Bioengineering, Applied Microbiology & Biotechnology, Biochemica et Biophysica Acta and Archives of Biochemistry & Biophysics occupied the first seven ranks in the sequence of use factor. Three journals, namely, J Biological Chemistry, Biochemica et Biophysica Acta and Archives of Biochemistry & Biophysics occupied 8th, 9th and 17th position in the ranking of microbiology journals done by Sengupta [15] but occupied 1st, 3rd and 10th position in the ranking of biochemistry journals done by him later [11] and 2nd, 6th and 7th positions respectively in the present ranking. The Biochemical Journal occupied 15th position in Sengupta's microbiology rankings of periodicals and 8th position in the ranking of biochemistry journals [11] against the 14th position occupied in the present list. This shows that there is little difference between present ranking with those of Sengupta. The journal of Biotechnology & Bioengineering which occupied 1st position in present study was ranked 66th by Sengupta [14]. One

obvious reason for this variation is that biotechnology and bioengineering are the thrust areas of research in Biochemistry division of the laboratory.

In geoscience, seven out of the fourteen journals subscribed by the library are finding place amongst the list of eighteen foreign journals. 20 journals including 8 Indian journals are highly cited by Indian scientists prepared by Pravathamma et al [10] and in sixteen journals (total 22 including 6 Indian) prepared by Nijagunappa & Nijagunappa [8]. The journals occupying 1st, 3rd, 4th, 5th, 11th, 13th and 16th in the present ranking are seen at 7th, 6th, 26th, 4th, 8th and 16th position respectively in the ranking list prepared by Pravathamma et al [10] and 10th, 4th, 22nd, 19th, 14th, 7th and 21st position in the ranking list prepared by Nijagunappa and Nijagunappa [8]. Since the nature of the research done in geoscience division of the laboratory is basic in nature, the conformity of the three lists with slight variation seems to be reasonable.

In inorganic chemistry only the Journal of Inorganic Chemistry occupying 6th position in the present list is finding place in both the lists prepared by R.S. Singh [18] and M.Singh [17] for chemistry journals. Most of the journals subscribed by the chemistry division cover highly specialized areas of applied research. These journals are therefore, poorly cited and their position in bibliographical citations based rankings is naturally low or absent. Since cement, fertilizers, chemicals and beneficiation of ores are the core areas of research in this division, the incidence of high use factors in the journals covering these areas is conspicuously clear.

## CONCLUSION

Though it is not claimed that the ranking of journals based on the above criteria is free from drawbacks, the above use based ranking is considered a practical tool to select journals for maximum utility for a library of any R&D institution to tide over the financial crisis due to the hike of journals and limitation of resources. Ranking of journals within the discipline provides an approach for inclusion or exclusion of journals to the extent the budget permits. However, the relative importance of a specific journal for a scientific library may change due to shift in R&D activities of the institution or emergence of more app



Table 5  
Rank List of Journals of General Interest

Sl. No.	Title of Journal	s	b	c x 4	p x 8	U <sub>r</sub>
		- d	- x 2 d			
1.	Nature	3.569	1.140	48	0	52.709
2.	Chemtech	3.533	2.267	40	0	45.800
3.	Science	3.429	1.143	32	0	36.572
4.	Scientific American	2.444	4.667	8	0	15.111
5.	New Scientist	3.451	2.392	8	0	13.843
6.	Discover	2.615	6.000	0	0	8.615
7.	R&D Management	2.333	3.333	0	0	5.666
8.	Futurist	2.571	2.286	0	0	4.857
9.	Impact of Science on Society	1.000	3.000	0	0	4.000
10.	Technology Review	0.500	0.200	0	0	0.700

journal covering sub-disciplines representing the institution's work. So, periodic review of the ranking of journals would be beneficial.

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#### REFERENCES

1. CHANDEL A S AND SARAF V : Overlapping in periodical acquisition - a study of special libraries of Lucknow, In : Planning in Library Resource Sharing, ed by Chandel and Veena; 1987. Print House, Lucknow. p.178.
2. Policy on Indian edition of foreign S&T periodicals (Editorial). *Current Sci.* 1989, 58 (17), 948.
3. GUPTA D K AND GUPTA S : Periodical literature in petroleum geology - a citation analysis study of obsolescence factor. *IASLIC Bull.* 1983, 28, 75-86.
4. HADAGALI P B: Frequently cited periodicals by Indian agricultural economist - a citation analysis. *IASLIC Bull.* 1983, 28, 59-66.
5. HOLDEN C : Libraries stunned by journal price increase. *Science.* 1987, 236 (4804), 908-909.
6. KUMAR D: A decade of rising subscription rates of Indian, British and US chemical journals - a preliminary analysis. *Ann Lib Sci Doc.* 1976, 23 (2), 189-194.
7. ARJUN LA L : Ranking of periodicals in the field of Soil Science. *Ann Lib Sci Doc.* 1990, 37 (2), 67-73.
8. NIJAGUNNAPPA R AND NIJAGUN : Core journals used by Indian geologists (1978-82). *J Geol Soc India.* 1981, 108.
9. OMOTOSO R O : Price trend in geology journals 1975-1985. *IASLIC Bull.* 1986, 1-5.
10. PARVATHAMMAN, GUNJAL S R and NIJAGUNNAPPA R: Core journals in earth science - a comparative study. *J Geol Soc India* (4), 387-395.
11. SENGUPTA I N: Bibliometrics and citation analysis of core periodicals. *Herald* 1980, 29 (3-4), 226-247.
12. SENGUPTA I N : Growth of the literature. *Nature.* 1973b, 244 (5), 244-245.
13. SENGUPTA I N: Choosing periodicals - study of growth of the field. *Ann Lib Sci Doc.* 1974, 21 (1), 1-5.
14. SENGUPTA I N : Choosing of journals - a study of growth of the field. *Ann Lib Sci Doc* 1974b, 21 (2), 1-5.
15. SENGUPTA I N : Weightage for periodicals in the field of microbiology. *Ann Lib Sci Doc.* 1989, 17 (3-4), 289-290.
16. SINGH J P : Rising trend in subscription of military science journal. *ILA* (2), 95-106.
17. Singh M : Studies of chemical changes in the ranking of journals - a citation analysis of data for 1975-1978. *Ann Lib Sci Doc.* 1978, 25 (1-4), 55-61.
18. Singh R S : Ranking periodicals from the point of view of Indian geologists. *Ann Lib Sci Doc.* 1974, 21, 55-67.