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Assessment of journal usage based on the cited journals in the published documents of an institute: a collection development perspective

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Journal collection in special libraries play a vital role for imparting the R&D programmes of any research institute. Building a good journal collection which suits the research needs and within the available fund needs evaluation of subscribed and to be subscribed journals in terms of usage and cost benefit. There are many ways to assess the usage of journals for taking collection development decisions and they are mainly categorized as 'User centered approaches' and 'Materials centered-approaches'. Many journals are well used in terms of citing, publishing by the library users but they may not be subscribed by the library and the journals subscribed by the library may not be much used by the users. The present study assume that the journals referred in the publications of an institute may be of relevant to the user community and treated as one type of usage. The study has analysed the publications of Bhabha Atomic Research Centre (BARC), Mumbai, India published during 2015-2019 and identified 753 journals which are cited more than 40 times. Among them 463 journals are not being subscribed by BARC Library. The 753 journals are categorised in three zones based on the number of times cited: Zone 1 of 26 journals which are cited by BARC scientists and engineers heavily (minimum 2193 times and a maximum of 6882 times); Zone 2 of 99 journals which are moderately cited (minimum 402 times and a maximum of 1446 times); and Zone 3 of 628 journals which are less used. The journals in the first zone are of greater importance to the user community which are all there in the list of subscribed journals except two as they are open access journals. Moderately used Zone 2 journals which are not being subscribed by BARC Library may be considered for the next year subscription by replacing the subscribed journals which are less used subject to fund availability.

Keywords: Journal usage; Collection development; Referencing; Institutional publications; Journal collection

Introduction

Libraries have not been immune to the growing difficulty of management problems in a world of increasing demand and decreasing resources[1]. The term "collection development" refers to the process of systematically building library collections to serve study, teaching, research, recreational, and other needs of library users. The process includes selection and de-selection of current and retrospective materials, the planning of strategies for continuing acquisition, and evaluation of collections to determine how well they serve user needs. Overall, collection development encompasses many library operations ranging from the selection of individual titles for purchase to the withdrawal of expendable materials[2].

The subscription of journals is always being hampered by the escalating cost of journals and the diminishing fund allocations. With the limited fund, the libraries have to build a collection which is best suitable and relevant to the library user community. Journals are being assessed based on their usage (both current and future) and they are ranked to take some objective journal collection development decisions like which are the journals to be added, retained, discontinued etc. There are many usage parameters which are already in use for ranking journals and many distinct methods are discussed in literatures[3-13]. These methods may be categorized in the following manner:

- ***User centered approaches***: The methods of the approach may be counts of re-shelving, inter-library loan, circulation, point-of-use surveys in the library, taking copies
- ***Materials centered-approaches***: The techniques adopted generally may be citation analysis, cost-effectiveness, impact factor, inclusion in reputed indexing databases, classified profile
- ***Combination of above methods***

- ***Other new methods***: Download statistics, denial reports from the publishers. These are applicable only to online journals.

Some of the parameters like impact factors of the journals are indicators of the world usage of the journals. Sometimes, even though the parameter will be high but the local usage will be very less. In contrary, sometimes the local usage of journals will be very high but the world usage may be very less. The collection development decisions must be based on the local usage rather than world usage.

Library users take copies of articles for reading purposes at later stage or download articles and keep it for reading. It may not be necessary that the copied or downloaded articles must have read by the users. But, when the library users referred the articles in their published documents, it may be sure that the researcher must have used the journal for referring the article. Aim of the present study is to quantify the cited journals in publications of an institute asa case study and rank the journals based upon the number of times referred. The list will be compared with the journals subscribed by the institution which will provide information about how many journals are highly used for referring and not subscribed by the library and how many journals are subscribed by the library but they are not much cited in the publications of the institute.

Methodology

Bhabha Atomic Research Centre (BARC), Mumbai, India is a premier multi-disciplinary Nuclear Research Centre of India having excellent infrastructure for advanced Research & Development with expertise covering the entire spectrum of Nuclear Science & Engineering and related areas. Scientific Information Resource Division (SIRD) of BARC satisfies the scientific and technical information needs of more than 5000 researchers of BARC. Journals articles published by SIRD during last five years (2015 to 2019) and indexed in *SCOPUS* database of Elsevier publishers are taken as the sample of published documents to analyse the references in them. SIRD subscribed to 702 journals in 2019 as R& D support services and these journals are being compared with the cited journals in BARC publications.

Results and Discussion

As per the objectives of the study, 'References' field in the 7541 records of journal articles published by BARC during 2015-2019 and appeared in *SCOPUS* database are analysed for the cited references. The results are discussed in the following sessions.

BARC has referred a total of 3,31,834 references through the 7541 publications with an average of 44 references per paper. The study has identified 753 top cited journals (at least 40 times) in the publications and the criteria for taking the top cited journals is chosen as those journals which are cited more than 40 times. The threshold is kept as more than 40 times so that the list of top cited journals comes near to the number of subscribed journals by the institute. Out of the 753 top cited journals, about 39% (290 journals) are being subscribed by the BARC Library. The non-subscribed 463 journals are altogether cited 55,055 times. The journals are ranked based on number of times cited and categorized in to three zones as highly cited, moderately cited and less cited keeping the number of times journals are cited in each zone is almost equal as being done in Bradford's law of scattering. The top cited 26 journals in the first zone with number of times cited are listed in Table 1. These journals are highly used journals by BARC scientists and engineers and they are treated as a must

Table 1—Top cited journals in BARC publications during 2015-2019 with subscription status (zone 1)

Journal	TC*	Subscription Status
Jour Nucl Mat	6882	Yes
Phys Rev Lett	6626	Yes
Phys Rev B	6122	Yes
Jour Am Chem Soc	5327	Yes
Phys Rev C	3762	Yes
Jour App Phys	3182	Yes
Jour Chem Phys	3150	Yes
Jour Phys Chem B	3139	Yes
Jour Phys Chem C	2690	Yes
Phys Rev	2497	Yes
Appl Phys Lett	2418	Yes
Jour Instrum	2411	Yes
Jour Alloys Compds	2255	Yes
Jour High Energy Phys	2236	Open Access
Jour Radioanal Nucl Chem	2195	Yes
RSC Advances	2193	Open Access
Langmuir	2034	Yes
Nature	1853	Yes
Science	1825	Yes
Phys Chem Chem Phys	1763	Yes
Chem Rev	1727	Yes
Inorg Chem	1700	Yes
Angew Chem Int Ed	1651	Yes
NucEng Des	1626	Yes
Nuc Inst Meth A	1619	Yes
Chem Commun	1527	Yes
Jour Nucl Mat	6882	Yes

*__TC__ = No. of times cited

list by the present study for BARC library. All the journals from the highly cited first zone journals are subscribed by BARC Library except *Journal of High Energy Physics* and *RSC Advances* as they are open access journals.

The second zone consist of 99 journals (Appendix I) which are cited moderately by at least 400 times and a maximum of 1446 times. These journals may be included in the to-be-subscribed list of journals by replacing journals with less usage and subject to availability of fund.

The third zone consists of 628 journals which are cited at least 40 times and a maximum of 396 times may be considered for subscription only if need arises. Few journals at the bottom of zone two journals which are not much used and subscribed by BARC Library may be replaced with journals in the top of the third zone list. This has to be decided based on other parameters and decision of the authorities.

Conclusion

Escalating cost of journals and scarcity of enough fund are real problems faced by libraries of research organisations. Best collection of journals which suits the budget as well as the changing research front of each institution needs a careful evaluation of journals. The ranking of journals based on relevancy and usage will help in collection development decision making. The present method provides a concrete idea about the journals directly used by the library users in their publications. The chronology-wise analysis of highly cited journals may provide highly used journals in different time periods because of the changes in research fronts of a research institution. The list of cited journals may vary in number by the nature of the research organization. The more the multi-disciplinarily research in nature the more the number of cited journals. The present method can be easily adopted in academic institutions like colleges and universities where the publications are comparatively less and it is recommended that the cited journals may be classified according to the subject. This type of analysis can be done without depending on any indexing databases when the number of publications are less in number and then the results will be more precise.

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Appendix I

Moderately cited journals in BARC publications and not subscribed in BARC Library (zone 2)

Journal	TC	Subscription Status
Dalton Transactions	1446	Yes
J Phys Chem A	1318	Yes
Nuc Inst Meth	1306	Yes
J Phys : Condens Matter	1299	Yes
Int J Hydrogen Energy	1275	Yes
Nuc Phys A	1268	Yes
Ann Nucl Ener	1259	Yes
J Phys Chem	1243	Yes
J MagnMagn Mater	1188	Yes
Comput Phys Commun	1162	Yes
Chem Mater	1158	Yes
Sens Actuators B Chem	1138	Yes
Nuc Phys B	1117	Yes
Mater Sci Eng A	1114	Yes
J Colloid and Interface Science	1097	Yes
J Electrochem Soc	1088	Yes
Appl RadiatIsotop	1075	Yes
J Phys D	1069	Yes
Chem Phys Lett	1058	Yes
Astrophys J	1041	Yes
Chem Soc Rev	1034	Yes
J Mater Chem	1022	Yes
Nuc Inst Meth B	1020	Yes
J Hazardous Materials	1003	Yes
Sol Extr Ion Exch	1003	Yes
Proc Natl Acad Sci	996	Yes
Environ Sci Technol	971	Yes
J Solid State Chem	907	Yes
Nano Lett	902	Yes
J Lumin	892	Yes
Appl Surf Sci	871	Yes
Mater Chem Phys	867	Yes
Radiat Measurements	864	Yes
Sci Rep	857	Yes
Radiat Protect Dosim	844	Yes
Radiochim Acta	824	No
Rev Sci Instrum	818	Yes
Talanta	816	Yes
J Membrane Science	803	Yes
Metal Mater Trans A	790	Yes
J Nucl Med	788	Yes
Chem - Eur J	759	Yes
Ind Eng Chem Res	756	Yes
Nature Mater	701	Yes
Electrochimica Acta	694	Yes
J Mater Sci	684	Yes
J Phys Chem Lett	677	Yes
Ceram Int	672	Yes
PLoS One	646	No

Journal	TC	Subscription Status
Colloid Surf A	643	Yes
Prog Nucl Energy	643	Yes
Sep Sci Technol	639	Yes
Chem Eng J	633	Yes
Macromolecules	630	Yes
J Mater Chem A	629	Yes
J Appl Cryst	625	No
Radiat Phys Chem	624	Yes
Carbon N Y	622	Yes
Phys B Condens Matter	614	Yes
Sep Purif Rev	602	No
J Biol Chem	598	Yes
J Environmental Radioactivity	590	Yes
J Non Cryst Solids	586	Yes
J Power Sources	584	Yes
Mater Lett	578	Yes
Phys Rev A	578	Yes
J Phys G: Nucl Part Phys	573	No
Nanoscale	570	Yes
Nuc Technol	566	Yes
Thin Solid Films	552	Yes
Phys Rep	542	Yes
Mater Res Bull	530	Yes
Chem Eng Sci	516	Yes
Mater Sci Technol	514	No
Powder Technol	504	Yes
Soft Matter	501	No
Scr Mater	499	Yes
Int J Heat Mass Transf	494	Yes
Nanotechnology	488	Yes
Fusion Eng Des	484	Yes
Water Research	478	Yes
solid state commun	470	Yes
J Phys Chem Solid	467	Yes
Corros Sci	464	Yes
Bioresour Technol	462	Yes
Mater Sci Forum	457	No
Nature Commun	456	No
J Nucl Sci Tech	446	Yes
Nuc Med Biol	445	Yes
J Mater Chem C	434	Yes
J Phys : Conf Ser	433	No
New J Chem	430	Yes
Polymer	427	Yes
Phys Lett B	426	No
Coord Chem Rev	418	Yes
Solid State Ion	408	Yes
Biochimie	406	No
IEEE Trans Nucl Sci	402	Yes
Nuc Acids Res	402	No