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Commentary

Whither Scientometrics in India

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Use of scientific literature for comparing scientific activity has a long history and dates back to 1917 in which Coles and Eales[1] analyzed publications in comparative anatomy published between 1543 and 1860 by simply counting the number of titles, both books and journal articles, and grouping them by country. In 1923, Hulme[2] published an analysis of the international catalogue of scientific literature for the years 1901 through 1913. Following the above works Gross and Gross[3] took the next step in the analysis of scientific literature in 1927 when they tabulated citations for the *Journal of the American Chemical Society*. Before the introduction of *Science Citation Index (SCI*) in 1963, the main source for undertaking bibliometric assessments were subject abstracts in different disciplines like Chemical Abstracts in Chemistry, Physics Abstracts in Physics, Engineering Index for Engineering and Mathematical Reviews for Mathematics etc. India also started publishing *Indian Science Abstracts* as early as in 1965. Earlier, all these abstracting services were published as hard copies. Later their CD-ROM versions started publishing and now all these services are available online as databases through the internet.

The first recognized quantitative assessment of scientific research in India was undertaken by Rangarao[4] of the Research and Planning Organization (RSPO) of the Council of Scientific and Industrial Research (CSIR), New Delhi. Rangarao analyzed Indian scientific output as reflected by papers abstracted in Volume 1 (1965) and Volume 2 (1966) of the Indian Science Abstracts published by Indian National Scientific Documentation Centre (INSDOC) now National Institute of Science Communication and Information Resources (NISCAIR). In these two volumes, Indian Science Abstracts included all the papers published in Indian journals by Indian authors and those papers which were published in foreign journals which resulted while working in an Indian institute for the period October 1964-September 1965. For undertaking the study Rangarao used a rudimentary method in which he prepared an index card for each record containing the bibliographic details (classification code of the paper, number of authors, name of the journal where the article was published and year of publication and type of communication like journal article, letter, review, case report etc). The author identified different scientific agencies involved in research in India, prolific institutions publishing research results, discipline of the papers, type of communication and the journals used for communicating research results etc. The results of the study were published in 1967 issue of the *Journal of Scientific and Industrial Research*.

I started doing Scientometrics under the guidance of my revered teacher Prof. S. Arunachalam in the year 1985. He assigned me a problem related to the assessment of scientific research in Singapore. The data for the study was collected from the hard copy of the Corporate Index of the Science Citation Index (SCI) for the years 1979 and 1980. In that era of SCI in hard copy, the data collection and examining citations was highly tedious and time consuming unlike the present situation where the data howsoever voluminous it might be, can be downloaded with the click of a button. In all 258 cards were made and citations for all these authors were examined for the period 1979-1985 from the hard copies of the SCI. Examining citations was a very tedious job as the printed version of SCI had a very small font size. Examining the citations with a naked eye was not possible at all and one had to use a magnifying glass to find out the citations of a particular author. Hence, using a magnifying glass I also collected citation data for 1979-1985. Later the data was analyzed and was presented by Professor Arunachalam at a conference organized by the American Association for the Advancement of Science, USA. Later the same was published in the international journal *Scientometrics*[5] which started publishing in 1978 by Hungarian Academy of Sciences.

During the last five decades, the quantum of Scientometric and bibliometric studies in India has increased significantly. This is reflected by the studies undertaken by Basu and Garg[6] and Garg and Tripathi.[7] Basu and Garg made an assessment of scientometric and bibliometric studies undertaken in India during 1970–1994 (25 years), while Garg and Tripathi assessed the quantum of scientometric and bibliometric studies published from India in national and international journals during 1995–2014 (20 years). Authors found that during the later period (1995–2014) the quantum of bibliometric studies published from India were about two-and half times more than the papers published during 1970–1994. More than half of these papers dealt with cross national assessment, assessment of individual journals and assessment of Indian output in different disciplines of science, technology and medicine unlike the previous study where the emphasis was on identifying core research papers in a field applying bibliometric laws particularly Bradford's law of scattering. This type of research had direct implications for strengthening library collection and also provided good indication to researchers across different fields to identify journals for referencing and publishing. As scientometrics become more used in evaluation of research performance in the micro and macro level and also for taking funding decisions, it also influenced Indian scientometrics research. Scholars publishing now in scientometrics come from very diverse background and provide new insights of structure and dynamics of research field. These studies are attracting cross-disciplinary readership. Scientometric based studies comes frequently in India's multidisciplinary journal *Current Science* where these studies are informing contemporary debates on topics like open science, university performance, etc. Some scholars are able to reach out further to journals which typically address dedicated areas of economics, science-society studies, management etc. This augurs well for the acceptance of this research domain within the research community. However, this type of papers that have strong analytical content and attract attention of the research community and policy makers are few within the whole corpus of research papers that are coming out from Indian authors in Scientometrics.

Like the earlier period, the field is still dominated by Library and Information Science (LIS) professionals working at different academic or research institutions. Some of the papers from the core LIS community in scientometrics have strengthened scientometric based research in India significantly. However, as I highlight with some examples in this commentary, a majority of them just exercises in counting with no analytical rigor and have questionable findings. We need to draw attention to this type of mushrooming growth of papers by Indian LIS scholars in scientometrics and bibliometrics. It also questions the journals which publish these types of papers, many of whom have doubtful identity.

The present commentary is based on my experience which I have gained during last four decades as an author publishing papers related to scientometrics in national and international journals and as a reviewer for papers submitted to five different journals published from India. The papers submitted to different journals can broadly be classified into the following categories.

- Studies related to evaluation of an individual journal or evaluating two or more journals;
- Studies related to evaluation of an individual institution like a university or a research institutions or comparing a group of institutions;
- Studies related to national assessment in a discipline; and
- Studies related to cross national assessment in a discipline.

In the following paragraphs, I have tried to illustrate with examples some typical problematics of a large majority of papers published by LIS professionals from India.

Evaluation of an individual journal: A paper on the bibliometric analysis of a particular journal (X), author used just 79 papers published in the journal during 2007–2013. Author examined the relative growth rate and doubling time of papers published in the journal during the five years, pattern of authorship and Degree of Collaboration (DC) suggested by Subramanayam[8] in 1983. It is the most used indicator by Indian authors in their studies when examining the pattern of authorship. It appears that recent measure like Collaborative Coefficient (CC) suggested by Ajiferuke *et al*.[9] for measuring co-authorship pattern is not known to the authors. It indicates that authors don't keep themselves abreast with latest literature in a field. In another study on the research output of CSIR-NISCAIR journals during 2010 to 2014 using Scopus database, author mentioned that *Annals of Library and Information Studies* published by CSIR-NISCAIR has published no paper in a particular year, which is just not possible. Also the paper was just a tabulation of data on yearly output, trend of authorship, geographical distribution of papers, most productive authors and highly cited paper with poor interpretation or no interpretation. In a third study on the Scientometric analysis of research performance of SAARC countries in Library and Information Science during 1996–2015 using Scopus database author just listed total documents, citable documents, and non-citable documents. All these parameters are available in SCIMAGOJR. It did not provide any information regarding the institutions or authors who contributed these papers. It was totally silent on the citations also.

Evaluation of individual institution or a group of institution: A paper on scientometric assessment of a CSIR research institution analyzed 399 papers published during 2012–2016 indexed in Web of Science. The author tabulated

type of documents used for publishing research results, growth of literature, pattern of authorship and calculation of DC, tabulation of prolific authors, subjects, collaborating countries and institutions with no interpretation of data and impact in terms of citations, the published output has made. In another paper which dealt with the evaluation of five institutions in a state tabulated the output for these institutions for a period of ten years and applied Participative Index (a simple percentage) to identify the most productive institute, which itself was clear from the output. Authors also calculated total impact by multiplying the number of papers with impact factor and DC. The authors did not provide any interpretation of the results presented.

National assessment in a discipline: In a paper on bibliometric analysis of a discipline in Indian context author provided a detailed description of the discipline being examined as well as a history of bibliometrics. The author tabulated data for five years, too short a period and tabulation of journals without giving any impact indicator for these and the listing of prolific authors without identifying the institutions to which these authors belonged. Author applied the formula of Relative Growth Rate (RGR) and Doubling Time which are not needed for such a small dataset.

Cross national assessment: In a cross national assessment on a certain topic authors examined the quantum of output during 2011–2016 using Web of Science as the data source. Authors tabulated data for growth of literature and used Relative Growth Rate for examining the pattern of growth, pattern of authorship using DC, prolific authors and journals used for publishing research results. The study did not examine where from these journals were published or what was the impact factor of these journals. To which institute the prolific author belonged etc.

DISCUSSION

A close examination of many papers submitted to different journal indicate that these studies used a very small period of study and the data set used is too small which leads to a fallacy of generalization. Several papers described in detail about bibliometrics or scientometrics. These are well known to authors or readers working in the area of scientometrics or bibliometrics. Some authors described the field which is being examined like what is cloud computing or remote sensing. It is important to address new research areas through Scientometrics but should provide more insights into the dynamics of the field as reflected through research papers and its implications. In some studies the review of literature is just listing of references without mentioning what data set has been used in these studies and what are their findings. Also, the authors do not connect the cited studies with their study. Several of the references provided in the papers are not related to the study. Several authors are not aware about how to cite the references in the paper as they don't scan instructions to authors of the journal to which the manuscript is being submitted. Certain formulas known to LIS professionals like Relative Growth Rate (RGR), Doubling Time (Dt) and Degree of Collaboration (DC) are applied without going into the utility of these formulas. Articles submitted to journals are not as per the submission requirements of the journal. Thomson Reuters classifies documents in several categories included in its database like research papers, editorials, letters, reviews, bibliographies, book reviews, biographies etc. What is to be included in the analysis is not known to the author of several papers. Authors are not aware about the different methods of counting and how these counting procedures influence the corresponding productivity distribution.

The major basic reason behind the proliferation of scientometric and bibliometric studies in India is that now all the data related to publication output and their citations can be downloaded with a click of a button and the downloaded data is just tabulated using MS Excel on different parameters. The easy availability of online databases has resulted in the glut of meaningless publications submitted to different journals, which casts a shadow on the nature of work being produced in the name of scientometrics and bibliometrics. What has been depicted in table is just reproduced in the text. The authors also need to have a sound grounding in general technical writing to improve the standard communication and to gain a reasonably respectful space in the community of scientometric practitioners. Based on the above, I would like to quote Professor P. Balaram[10] that "Scientometrics in India is a field in the grip of practitioners, who are largely devoid of the insights that are necessary for scholarly and thoughtful analysis" One must be clear what one is measuring and state how the measurement is made. By observations in this commentary comes from papers I receive for evaluation and closely examining a large cross-section of papers published in Indian journals in scientometrics. This can lead to some fallacy in my interpretation. However, the broad issue that I intend to raise is on improving the quality of research which is becoming weak due to the opportunity given to authors to choose from a wide set of journals which are lacking or compromising on robust peer review system. Safeguard need to be built within the system to improve research quality which can help scholars from Indian scientometrics research community to gain recognition from research community and policy makers which it deserves. A few papers have created a benchmark but this number has to increase to make the impact of this field visible.

REFERENCES

1. Cole FJ, Eales NB. The history of comparative anatomy. Science Progress. 1917;11(44):578-96.
2. Hulme EW. Statistical bibliography in relation to the growth of modern civilization. London: Grifton. 1923.

3. Gross PLK, Gross EM. College libraries and chemical education. Science. 1927;66(1713):385-9.
4. Rangarao BV. Scientific Research in India: An Analysis of Publications. Journal of Scientific and Industrial Research. 1967;26:166-76.
5. Arunachalam S, Garg KC. A small country in a world of big science: A preliminary bibliometric study of science in Singapore. Scientometrics. 1986;8(5-6):301-13.
6. Basu A, Garg KC. Scientometrics/Bibliometrics in India: An Overview of Studies during 1970-1994. Journal of the International Society for Scientometrics and Informetrics. 1996;2:143-58.
7. Garg KC, Tripathi HK. Bibliometrics and Scientometrics in India: An Overview of Studies during 1995-2014 Part I: Indian Publication output and citation impact. Annals of Library and Information Studies. 2017;64:28-36.
8. Subramanyam K, Bibliometric studies of research collaboration: A review. Journal of Information Science. 1983;6(1):33-8.
9. Ajiferuke I, Burrel Q, Tague J. Collaborative coefficient: A single measure of the degree of collaboration in research. Scientometrics. 1988;14(5-6):421-33.
10. Balaram P. Science, Scientists and Scientometrics. Current Science. 2004;86:623-4.