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INSDOC'S CONTRIBUTION TO BIBLIOMETRICS*

B K Sen
80 Shivalik Apartments
Alaknanda, New Delhi –110012
Email: bksen@ndb.vsnl.net.in

Bidyarthi Dutta, Anup Kumar Das
Digital Information Consultants Pvt. Ltd.
73/20, Golf Club Road
Kolkata 700033
Email: das_anup@rediffmail.com
Email: bidyarthidutta@rediffmail.com

Traces the history of bibliometric research, and related training activities in INSDOC. Describes briefly the objectives, facilities, services, research activities, and publications of National Centre on Bibliometrics.

INTRODUCTION

Indian National Scientific Documentation Centre (INSDOC), New Delhi is one of the organizations in the world that has greatly devoted itself to the emerging discipline of bibliometrics by contributing towards the development of the subject, generating services to help scientists in making vital decisions like selecting a scientist for a national award or a prestigious fellowship, making scientists aware of the value of their work, helping librarians in reducing the number of subscribed periodicals judiciously when there is shortage of funds; and so on. In this article the bibliometric contributions and activities of INSDOC since 1958 are recounted.

GENESIS

The review of bibliometric literature conducted by Sen and Narendra Kumar [1] showed that the first contribution on bibliometrics from India emanated from INSDOC with the publication of an article by Dutta and Rajagopalan in 1958 [2]. The article was on the study of citation practices in 200 Indian and foreign S & T journals.

MAJOR CONTRIBUTIONS

Coverage of Indian S & T Literature

B S Kesavan, after joining INSDOC in early 1960s, decided to bring out *Indian Science Abstracts* covering all Indian contributions on science and technology appearing in journal articles, conference documents, and so on. This decision raised many an eyebrow and questions from various quarters. Some of the scientists were of the opinion that Indian scientific contributions were being adequately covered by international abstracting and indexing services, hence there was no need to bring out another publication recording these contributions. Are Indian contributions covered adequately by international abstracting and indexing services? This question occasioned several studies and showed that the coverage of Indian literature was inadequate in most cases and grossly inadequate in some cases. *Mathematical Reviews* and *Bulletin Signaletique* covered 55.2% and 50.5% Indian mathematics literature respectively [3]. In the case of physics, the coverage was found to be 65.5% and 57.4% in *Physics Abstracts* for the years 1960 and 1961 respectively [4]. Of all the abstracting services, the coverage of Indian literature was found to be the best in *Chemical Abstracts* that covered as much as 90% of Indian chemical literature within 24 months [5]. The coverage of Indian medical literature by *Index*

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Medicus and *Excerpta Medica* was found to be the worst [6]. The services covered 38% and 13.5% of Indian medical literature respectively. The coverage of Indian agricultural literature by six CAB abstracting services was also studied [7]. The coverage of Indian literature of 1961 and 1962 by these services were as follows: *Soils and Fertilisers* (29.8%, 36.6%), *Plant Breeding Abstracts* (63.3%, 65.6%), *Horticultural Abstracts* (32.1%, 40.9%), *Field Crop Abstracts* (23.5%, 34.4%), *Animal Breeding Abstracts* (58.3%, 55%) and *Dairy Science* (86.7%, 67.6%). The poor coverage of the Indian S &T literature by most of the international abstracting and indexing services justified more than enough the launching of the *Indian Science Abstracts* in 1964 which continues to date.

Hints of India's Nuclear Capability

In 1965, Guha et al [8] carried out a study basing 750 periodicals covered by *INSDOC List* in 1964 and detected 1406 Indian S&T articles published in foreign journals. Of these articles, a large number were devoted to nuclear science and technology. Basing this finding, Indian press presumed that India had developed the capability of making an atom bomb and flashed the news. Though the study did not presume any such thing, the later happenings however indicated that the presumption of the press was possibly not wrong.

Indian Contributions in Nobel Lectures

It is a custom with every Nobel laureate to deliver a lecture based on the topic for which he has been awarded the Nobel Prize. The lecture is usually called the Nobel Lecture. In the lecture, the Nobel laureate brings out the salient features of his contribution, acknowledges the work of others that has helped him and also names those who has been influenced by his work. Sen [9] studied the citations of Indian contributions in Nobel lectures (Physics 1901 –62; Chemistry 1901 –62; and Medicine 1922 –62), and found that in all twenty-one Indian scientists were cited in the aforesaid Nobel lectures, of which twelve were cited by CV Raman. MN Saha was the first to be cited (cited by WH Nerst 1920), and SN Bose and HJ Bhabha were the last to be cited (both were cited by H Yukawa in 1949).

Change of Titles

Change of titles of periodicals is a common phenomenon. For example, the title of *Annals of Library Science* changed to *Annals of Library Science and Documentation* in 1965 and to *Annals of Library and Information Studies* from 2001. The change of titles poses many problems in literature search, bibliographical control, and so on. A study was undertaken at INSDOC to explore the causes of this phenomenon. Unfortunately, the study could not be completed. In all, five instalments of the study were published [10-14] which revealed many causes of the change of titles. Merger of two or more titles; splitting of a title; change in the place name, sponsor name, and periodicity forming part of the title; change in the scope, etc are some of the common causes of the change of titles of periodicals.

Other Contributions

Other bibliometric and related studies conducted by INSDOC pertain to length of Indian names [23], nascent subject , i.e. supergravity [24], informetrics [25], Indian chemical periodicals [26], Indian scientific periodicals [27], Indian medical periodicals in *Science Citation Index* [28], Indian S & T journals in *Science Citation Index* [29], Citation behaviour of chemical scientists [30], Standard impact factor [31], *Journal of Oilseeds Research* [32], Evaluation of science [33], Review of bibliometric studies done in India [34], etc.

NATIONAL CENTRE ON BIBLIOMETRICS

The establishment of the *National Centre on Bibliometrics (NCB)* in 1988 with the support of NISSAT is possibly the greatest contribution of INSDOC to bibliometrics [15].

Objectives

The objectives of the Centre were

i) to create S & T citation database of Indian contributions appearing in Indian S & T journals;

ii) to develop tools, techniques and modalities for the analysis of research output based

on SCI data and the Indian S &T citation database;

iii) to analyse the research outputs of selected research institutions, agencies, universities and other similar bodies.

The efforts enumerated above would result in the development of science indicators that could be useful in planning, funding, policy making for R & D management, assessment of R & D output, etc. in any specialised system or conglomeration of systems.

Facilities

The Centre has all the cumulative volumes of *Science Citation Index* (*SCI*) from 1955 to date in print form. It has also annual versions in CD-ROM of *SCI* from 1980 to date. The *Journal Citation Report* (*JCR*) is also available from the very first issue. The print form of *SCI* is available for consultation at the National Science Library, INSDOC, New Delhi.

Services

The services of the Centre among others comprise the following:

i) Analysis of research outputs of individual scientists, teams, institutions, etc.

ii) Organization of training courses on bibliometrics.

iii) Consultancy relating to bibliometric studies, improvement of impact factor of journals, etc.

iv) Supply of impact factors of all S&T journals including those not covered by *SCI*.

v) Reply to queries pertaining to bibliometrics, etc.

Ever since its establishment, *NCB* has been carrying out citation analysis of scientists for potential Bhatnagar awardees, INSA fellows, and so on. This service has made a big impact in the scientific communities in the country. It is strongly believed that evaluation of a scientific work becomes much more objective when peers evaluate the works of a scientist taking into account the citation scenario of the works.

Research

Evaluation of Recent Research Output

The major activity that NCB took up after its establishment was the evaluation of the research output of CSIR laboratories. The evaluation using citation analysis is an established method. This method of analysis is applicable for only those papers which are at least four- to five-year old. But the job that was assigned to NCB was to analyse the most recent papers, i.e. the papers of the last year. No known method was available to evaluate such recent papers. Hence, research was needed to develop a completely new method for evaluation. The method developed was based on the impact factor of the journals wherein the papers were published, the impact factor being considered as the score of the papers. When the paper describing the method was presented to the *International Conference on Science Indicators for Developing Countries,* Paris, 15 - 19 October 1990, the Chairman of the Session, Thomas O Eisemon declared that all other papers presented in the Conference were works on methods developed earlier. But the paper by Sen and Kumar describes a completely new method. The paper was later published in *Scientometrics* [16].

To check whether or not the aforesaid method was correct, another study was conducted in 1991, taking the 1988 papers as the sample [17]. For *CSIR Research Output* of 1988, impact factors of the journals were considered for evaluation. The 1991 study was based on the citations received by the sample of the aforesaid papers published in 1988. The ranking of laboratories according to citations excellently tallied with the raking of 1988 study done with impact factor. Thus, this study validated the method employed in 1988 using impact factors.

Using this method, the *CSIR Research Output* is published till date and acts as an valuable tool for planning, decision making, funding and so on.

Impact Factor of non-SCI Journals

CSIR Research Output used to include all research papers published by CSIR laboratories during the previous calendar year. To determine the total impact factor, average impact factor, etc of all CSIR laboratories individually and collectively, it was necessary to have impact factors of all publications. As *JCR* does not provide impact factors of all S & T periodicals, necessity arose to develop a method to determine the impact factors of all periodicals not covered by *SCI* . The method developed for the purpose [18] was hailed by Eugene Garfield as an effective method for determining the impact factor [19].

Normalised Impact Factor

The research horizon of all CSIR laboratories encompasses almost all fields of science and technology. The ranking of CSIR laboratories based on the total impact factors and average impact factors placed some of the laboratories at a disadvantage because of the wide variation of impact factors from field to field. For example, the highest impact factor in biochemistry and molecular biology is usually above 20, the same in aeronautics is around 0.5. The performance of laboratories working on these two different areas showed huge disparity in terms of the total impact factor and average impact factor. To reduce this disparity, the idea of normalised impact factor came into being. In the case of normalised impact factor, the highest impact factor in all fields were considered as 10, and accordingly the impact factors of all periodicals within each field were calculated and used for the purpose of evaluation [20, 21].

Ranking of Scientists

When INSDOC started getting orders for conducting citation analysis of the nominees for various awards and fellowships, it was thought desirable to rank the scientists belonging to the same field. For several years, it was seen that the scientists occupying the top ranks in our list were getting the awards or fellowships. This emboldened us to publish the method of ranking developed by us [22].

Indian Science Citation Index

Science Citation Index (SCI) brought out by the *Institute of Scientific Information,* USA covers only about a dozen Indian S&T periodicals out of some six hundred. As a result, SCI fails to portray properly the citation scenario of Indian papers. To solve this problem, the idea of *Indian Science Citation Index* was conceived. Necessary software was developed basing CDS/ISIS package and adequate testing done. The creation of the database also began with great enthusiasm. Unfortunately, the project faced an immature suspension.

Publications

CSIR Research Output [35] is a regular publication brought out by the *National Centre on Bibliometrics* annually. The circulation of the publication is, however, restricted. *In Search of Knowledge* is another important publication brought out by the Centre [36]. This publication comprises best research papers produced by CSIR ever since its inception in 1942. The best papers were selected by the respective laboratories first. From among these papers only those were included in the aforesaid volumes that fulfilled the citation-based criterion fixed for each subject.

TRAINING

Ever since the inception of the INSDOC course titled Associateship in Documentation and Reprography in 1964 (*now known as* Associateship in Information Science), bibliometrics is being taught. The first dissertation on bibliometrics from India, to our knowledge, was produced by JS Ghosh as a student of INSDOC course in 1967 [37]. A look at the dissertation by Eugene Garfield was enough to earn Ghosh a job at the Institute of Scientific Information, USA, the producer of *Science Citation Index*. Another internationally famous bibliometrician, i.e. IN Sengupta is also a product of the INSDOC course. The names of other bibliometricians INSDOC has given birth to can be seen from the list of references given below. Till date, INSDOC offers a complete elective paper entitled *Informetrics and Collateral Areas* for AIS course, and organizes short-term courses on bibliometrics from time to time.

CONCLUSION

The modest beginning of bibliometrics research that INSDOC witnessed in late 1950's continued towards maturity with the progress of time and reached its hayday in late 1980's when Mr T K Datta was the Scientist-in-Charge. It is during his short tenure of slightly more than a year, the *National Centre on Bibliometrics* (NCB) came into being, the book *In Search of Knowledge* was published, and *CSIR Research Output* was born. The *National Centre on Bibliometrics* could not grow the way it should have due to various factors. NISSAT's financial support which was vital for NCB's sustenance and growth started gradually dwindling and eventually stopped by mid-1990's. It is unfortunate that the *National Centre on Bibliometrics*, which could have been a forerunner in the area of bibliometrics in the world, is almost a non-entity today.

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