

## DEVELOPMENT OF AN INSTITUTIONAL DATABASE OF CITATIONS USING CDS-ISIS SOFTWARE

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*A citation database of scientists belonging to National Environmental Engineering Research Institute has been developed in CDS-ISIS for the creation of an institutional database of citations. The study suggests that creation of such institutional databases can be a step towards the creation of an Indian Science Citation Index.*

### INTRODUCTION

Scientific communications contain citations to documents which support, provide precedence or elaborate the author's work. Citations are the formal explicit linkages between papers that have particular points in common [1]. A citation index built around these citations besides being used as a bibliographic information retrieval tool also serves an extended purpose of evaluating the performance of individual journals, scientists and institutions, etc. A citations database indeed helps to provide, a rough but objective scenario of the impact of an institution's publications. Much importance is attached to publication of research papers in high impact factor journals, based on the *Science Citation Index* evaluation, obviously for receiving wider recognition and more citations. Considering the genuine limitations on coverage of journals from various countries in the *Science Citation Index*, Dr. Eugene Garfield suggested the development of local citations indexes by countries to evaluate the journals in the home country [2].

Within the country, each scientific research establishment is devoted to research in a specific subject discipline and the research contributions are disseminated through journal articles, conference papers, reports, chapters in documents etc. The library and information centre of each institution acquires atleast a reasonable number of core international and national journals in a specific field. This study makes premise that it is possible to develop an

institutional database of citations received by an institution's scientists, by tracking the references in these journals. It is further also possible to incorporate the citations received in other types of documents received in the library.

### METHODOLOGY

The present study was undertaken for the National Environmental Engineering Research Institute (NEERI). The NEERI library receives over 150 international and national journals in environmental science and engineering and related disciplines. A citation database of NEERI's scientists was conceived based on the journals and other documents acquired in NEERI library. The citations in the issues of journals were meticulously monitored and those of NEERI's scientists were entered into the database.

### DATABASE DEVELOPMENT

CDS-ISIS software developed by UNESCO was used for database development. The datafields identified for the database are given below :

- |   |                         |
|---|-------------------------|
| * Authors cited                                   | * Citing Author         |
| * Title   | * Title                 |
| * Document Type                                   | * Document Type         |
| * Citation Year                                   | * Citation Year         |
| * Title of journal, volume, issue number and page | * Bibliographic details |
| * Source document                                 | * Citation category     |
|   | * Citation Pattern      |

Parallel fields are required to be generated within cited and citing documents. Due care was exercised in the nomenclature of the datafields. Further, the last two fields were specifically identified from the view point of observations on

Table 1 — Frequently Cited Authors

Authors	No. of Citations	Broad Subject
Khanna, P	33	Environmental Engineering
Bulusu, K.R	28	Water Treatment
Bhide, A.D	23	Solid Waste Management
Nawlakhe, W	23	Water Treatment
Kumaran, P	20	Microbial Degradation
Kaul, S.N	18	Industrial Waste Water Management

Indian and International citations as also self citations.

### Data Period

The citations were monitored by documents received in the library from 1998 onwards. A total of 411 citations received by NEERI scientists were incorporated in the database.

### Search Keys

The database was made searchable by the following search keys :

- \* Authors cited
- \* Document type wise citations
- \* Year of cited document
- \* Cited and citing journals
- \* Citing authors
- \* Self citations
- \* Indian or International citations

### Cited Authors

The database revealed the number of citations received by individual authors during the study period as given in Table 1.

### Citations in International Journals

There were 151 citations in international journals that contained citations to NEERI publications is given in Table 2.

The study revealed that there were 88 papers published in Indian journals which were cited in international journals. This observation demonstrates that publication in Indian journals

Table 2 — Citing Journals : International

*Analyst*  
*Applied and Environmental Microbiology*  
*Bulletin of Environmental Contamination & Toxicology*  
*Bioresource Technology*  
*Biotechnology & Bioengineering*  
*Canadian Journal of Microbiology*  
*Critical Review in Environmental and Technology*  
*Environmental Engineering Science*  
*Environmental Management*  
*Environmental Monitoring & Assessment*  
*Environmental and Waste Management*  
*Environmental Pollution*  
*Environmental Systems Reviews*  
*Environmental Technology*  
*Enzyme & Microbial Technology*  
*Institute of Waste Management, Proceedings*  
*International Journal of Environmental Education & Information*  
*International Journal of Environmental Studies*  
*Journal of Environmental Engineering ASCE*  
*Journal of Environmental Science & Health "A"*  
*Talanta*  
*Water Air and Soil Pollution*  
*Water Environment Research*  
*Water Research*  
*Water Science & Technology*  
*World Journal of Microbiology & Biotechnology*

does not hamper the impact on the international citability.

### NATIONAL CITATIONS

The study revealed 260 Indian citations. NEERI is a prime research institute in India in environmental engineering and science and the nationally received citations are legitimate acknowledgement by the fellow scientists in other establishments in the country. Information on environmental issues and R&D studies thereon having national relevance is best disseminated and used within the country. Amongst the national journals being published in environmental science and engineering, NEERI's own *Indian Journal of Environmental Health* is the oldest established journal. There were 91 citations to this journal in the citing

journals. Citations received by *Indian Journal of Environmental Health* show that it is an important journal on the subject from India.

### DOCUMENT TYPEWISE CITATIONS

Besides journal articles, an institution's communications may be disseminated in the form of conference papers, chapters in composite document, reports, digest etc. The extent of citations to such documents is also revealed through such a database. It was seen that the *Manual on Water and Wastewater Analysis* published by NEERI had 18 citations.

### CITATION LIFE

As revealed from the database, the oldest cited document pertaining to 1961 cited internationally in 2001. During the study period, 28 citations were observed to papers published between 1961-1970.

### SELF CITATIONS

A person's citation rate tends to be inflated by self citations and studies have shown that atleast 10% of all citations are self citations. During this study 41 self citations were noted. Since a scientist tends to build on his or her own work, self citations are justified to a certain extent.

### CONCLUSION

The study on development of institutional database of citations has provided a realistic insight into the aspects below :

- Papers by NEERI scientists that have been cited
- International citations
- National citations
- Document type-wise citations
- Self citations
- Cited authors

Few issues that were encountered and need careful consideration in the development of such a database are:

- (1) Monitoring citations is labour intensive task. More specifically, with review papers wherein large number of citations are included.
- (2) It is essential for the institutional database developers to have familiarity with the names of the institution's scientists, so that a bibliographic record for each citation appearing can be made.
- (3) Despite the availability of guidelines for rendering bibliographic references from national and international standardization agencies as well as from the editorial policies of journals, inadequate information in references necessitate physically verifying data.
- (4) In an interdisciplinary field such as environmental science and engineering the citations are likely to extend much beyond the core journals.

The Bradford's Law of Scattering which states that the major part of the literature of a discipline is concentrated in a few core journals and the rest scattered over a large number of journals in other areas, applies equally to the citations as well. The database can be further enriched by maintaining a partnership with the scientists to incorporate data on any additional citations noticed by them in publications which might be otherwise missed.

Utilizing the information resources of the Library and Information Centre, individual libraries can collectively build up *Indian Science Citation Index* which can be further augmented with data from *Science Citation Index*.

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### REFERENCES

- 1 Garfield, E. *Citation Indexing*. New York: John Wiley, 1979.
- 2 Garfield, E. *Current Science*. 73, 8; 1997.