

A Bibliometric Study of Papers Presented at the International Conference “The Role of Science and Technology in Global Development”

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Abstract

Purpose: The purpose of the study is to make a bibliometric assessment of the papers presented at the international conference “the role of S & T in global development” to identify institutions and their locations that are involved in propagating Hindi as a medium of communication in science and technology.

Methodology: The source of data for the study was 660 papers that were presented orally or as posters at the above mentioned international conference organized by DESIDOC, Delhi from December 5-7, 2013. Data related to number of authors, gender of contributing authors, name of the contributing institutions and the agency to which it belonged was fed into the MS-Excel sheet for analysis. Method of complete counting in which all contributing authors or institutions have been given a unit credit has been used in analysis.

Findings: Academic institutions were the largest contributors to the conference followed by Defence Research and Development Organization (DRDO). Most of the papers were contributed by Indian authors with a few from abroad in collaboration with Indian authors. Among the states, Delhi/New Delhi made the highest contributions followed by Uttar Pradesh. Delhi/ New Delhi also topped the list of contributors among the cities. Among the institutions, DESIDOC made the highest number of contributors. Most of the papers were single authored and the share of women contributions was about 25% of the total authors.

Research Limitations: No similar study has been published in literature with which its findings could be compared.

Practical Implication: The study throws light on the penetration of Hindi in popularization of science and technology and the role of women authors in it.

Originality: Several studies have been published in literature on different aspects of bibliometrics. However, no study has been reported in literature that deals with bibliometrics of papers presented at international conferences. This is the first study on the topic.

Keywords: Conference, Bibliometrics, DESIDOC, S&T, Development

Paper Type: Research

1. Introduction: Researchers use different channels of information sources to publish their research findings and conference proceedings is one such channel. Conference Proceedings are defined “as official record of the things said and done at a conference or meeting” (Ali, 2006). These are usually made available as a booklet or a CD-ROM containing the versions of the papers delivered at a particular conference. Conferences bring new knowledge to the attention of the research community. These are considered as major source of primary information on cutting edge research and development; particularly in the fields of science, engineering and technology in addition to journal papers. Conference proceedings serve three specific functions (Drott, 1995). First, they help researchers to improve their papers by

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allowing the latter to gather feedback from other researchers before submitting the presented paper to a journal. Second, they stimulate discussion within a field by allowing researchers to exchange ideas on emerging questions. Third, they can be a vehicle for information that would otherwise be difficult to include in an article. Several conferences are held in different areas of science, engineering and social sciences every year in different parts of the globe. However, these conferences vary in size and quality as several of the papers presented at these conferences are not peer reviewed.

2. Review of Literature: Several studies dealing with bibliometric and citation analysis of individual journals are available in literature (Kumar, 2008; Garg, 2008; Kumar, 2011; Garg, 2014). However, only a few studies dealing with bibliometric analysis of the conference proceedings have appeared in the literature. According to Glanzel taking conference proceeding into account in bibliometric studies produces a more complete and precise picture of a given discipline's scientific production (Glanzel, 2006). Wong gave the critical importance of conference proceedings in his correspondence to *Nature Magazine* by giving reference to two papers which were originally published in conference proceedings and later the authors went on to win the Nobel Prize for Physics in 1979 and Noble Prize for Chemistry in 2002 (Wong, 2008). In the disciplines of computer science and engineering, a vast majority of the peer-reviewed publications are in the form of conference proceedings and reviewed the differences between computer science and engineering conference publications and the traditional journals used in other scientific disciplines, discussing the effect of these differences on the scholarly communication in these fields (Shamir, 2010). The scientific impact and aging of conference proceedings in comparison to other form of scientific literature was examined by Lisse (Lisse, 2006) and found that the scientific impact of proceedings is losing ground to other types of scientific literature in nearly all fields, but it has grown from 8% of the references in engineering papers in the early 1980s to 10% in recent years. Proceedings play a particularly important role in computer sciences, where they account for close to 20% of the cited references.

3. Research Problem: An international conference was organized by Defence Scientific Information and Documentation Center (DESIDOC), Delhi, of the Defence Research and Development Organization (DRDO) from December 5-7, 2013 on the topic "The Role of Science and Technology in Global Development". The medium of communication of the conference was Hindi, because the aim of the conference was to spread the use of Hindi in the promotion of science and technology. About 700 articles/research papers were received from scientists/educationists from 20 countries scattered in different parts of the globe. Of these, 660 were accepted for oral or poster presentation. Of the 660 accepted papers, 292 were oral presentations and 368 poster presentations. The conference was attended by 850 delegates from India and 40 delegates from abroad.

The papers presented at the conference were published in 11 edited books. The titles of these books along with number of papers included in each are as follows:

- a) Scientific Research (47 papers);
- b) Contemporary Scientific Research (45 papers);
- c) Scientific Research and Development (46 papers);
- d) Contemporary Science (48 papers);
- e) Role of Science and Technology in Global Development (50 papers);
- f) Science (54 papers);
- g) Science Communication (45 papers);
- h) Information Science (48 papers);
- i) Hindi in Today's India (62 papers);

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- j) Present Scientific Research (47 papers);
 k) Science and Culture (49 papers);
 and Number of Abstracts (119)

The present paper makes a bibliometric analysis of the above listed papers.

4. Objectives: Following are the objectives of the study:

- To examine the distribution of contributions by performing sectors;
- To examine the geographical distribution of contributions by Indian states and cities;
- To examine the distribution of contributions by institutions;
- To examine the pattern of authorship of the papers presented and their distribution by gender.

5. Findings

5.1 Data and Methodology: The source of data for the study was 660 papers that were presented orally or as posters at the above mentioned international conference organized by DESIDOC, Delhi from December 5-7, 2013. Since Hindi was the medium of communication of the conference, the first step was to translate the bibliographic information into English. The translated data was fed into MS-Excel for analyzing the bibliographic records. The parameters fed into the MS-Excel sheet were the number of authors, gender of contributing authors, name of the contributing institutions and the agency to which it belonged, their regional distribution by state and city. All the collected data were tabulated and analyzed to meet the objectives mentioned above. The methods of complete count were used in which all contributing authors or institutions have been given a unit credit. This helps in getting the total number of participating institutions and authors. However, this results in inflation of data relating to the total number of authors and institutions than the actual number of papers. In the present case also the total has inflated to 795, while the actual number of papers was 660.

5.2 Results and Analysis

5.2.1 Distribution of Contributions by Performing Sectors or Agencies: Since independence India has developed a vast infrastructure for science and technology. Several agencies are involved in scientific research in India. These are universities and institutes of higher learning like Indian Institutes of Technology (IITs), engineering colleges, medical colleges and hospital. Besides these, government funded laboratories under the aegis of different performing sectors like the Council of Scientific and Industrial Research (CSIR), Department of Atomic Energy (DAE), Department of Science and Technology (DST), Department of Biotechnology (DBT), Defense Research and Development Organization (DRDO), Indian Council of Agriculture Research (ICAR), and Indian Council of Medical Research (ICMR) etc contribute to Indian scientific output. Analysis of data on the distribution of contributions according to different performing sectors is given in Table 1. It indicates that like scientific output, academic institutions (universities and colleges) were the highest contributors (32.2%) to the total papers discussed at the conference. This was followed by contributions from DRDO (19.6%), the sponsoring agency of the conference, engineering colleges (9.8%), ICAR (8.6%), and IITs (5%). The share of these five performing sectors is approximately three-fourth of the total papers discussed at the conference. Rests were contributed by other performing sectors listed in Table 1.

Table 1: Distribution of Contributions by Performing Sectors

Sl. No.	Name of performing sector	No. of contributions
1	Academic Institutions	256

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2	Defence Research and Development Organization	156
3	Engineering Colleges	78
4	Indian Council of Agriculture Research and SAUs	68
5	Indian Institutes of Technology (IITs)	40
6	Ministries under the central Government	24
7	Council of scientific and Industrial Research	21
8	Department of Space	14
9	Medical Colleges	9
10	Department of Atomic Energy	8
11	Department of Science and Technology	5
12	Individual and others	70
13	Others not identified	46
Total		795

5.2.2 Distribution of Contributions by Country and Indian States: The analysis of data by institutional affiliation of authors indicates that 660 papers were contributed by authors from abroad as well as from India. The contributions from abroad were scattered among 17 nations. Among the authors from abroad, highest (10) contributions were from the USA followed by UK (5), Italy (3) and Australia and New Zealand contributing two papers each. Most of the contributions made by authors from abroad were in collaboration with Indian authors.

Table 2 depicts the distribution of contributions by Indian states. Of all the states, highest (30%) contributions came from Delhi/New Delhi, followed by Uttar Pradesh (14%) and Haryana (11%). These three states together contributed more than half (~ 55%) of the total papers. Remaining 45% papers were contributed by other states. Further analysis of data depicted in Table 2 indicates that 77% of the contributions, as expected were made by Hindi speaking states. However, the share of Bihar among the Hindi speaking states was very less. Among the non-Hindi speaking states, Maharashtra, Karnataka and Gujarat contributed the highest number of papers.

Table 2: Distribution of Contribution according to the Indian States

Sl. No.	Name of state	No of contributions
1	Delhi/New Delhi	236
2	Uttar Pradesh	114
3	Haryana	87
4	Madhya Pradesh	49
5	Maharashtra	39
6	Rajasthan	37
7	Chhattisgarh	35
8	Uttarakhand	28
9	Karnataka	23
10	Gujarat	22
11	Andhra Pradesh	12
12	Punjab	11
13	Jharkhand	10
14	Tamil Nadu	09
15	Jammu and Kashmir	08
16	West Bengal	07
17	Bihar	06

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18	Total	733
19	Other Indian States	14
20	States not identified	13
21	Grand Total	760
22.	Contributions from abroad	35
Grand Total		795

5.2.3 Distribution of Contributions by Indian Cities: The total presentations came from 122 cities located in different parts of India. Table 3 depicts the distribution of contributions by cities. Highest (236) number of contributions came from institutions located in Delhi/New Delhi, the venue of the conference. Also the contributions made by authors from Delhi/New Delhi are more than the total contributions (201) made by other cities listed in Table 3. Thus, the cities listed in Table 3 contributed about 55% of the papers presented at the conference. Remaining 45% contributions came from other 109 cities. Thus, it can be stated that more than half of the presented contributions were made only by 13 cities. All these cities were located in the Hindi speaking states except Pune, Ahmadabad/Gandhi Nagar and Bangalore which are located in non Hindi speaking states of the West and South India.

Table 3: Distribution of Contribution according the Indian Cities

Sl. No.	Name of City	No of Contributions
1	Delhi/New Delhi	236
2	Jhajjar	24
3	Pune	22
4	Ahmadabad/Gandhi Nagar	21
5	Lucknow	19
6	Rohtak	19
7	Raipur	17
8	Varanasi	17
9	Bangalore	15
10	Noida/Greater Noida	14
11	Bahadurgarh	13
12	Dehradun	10
13	Jaipur	10
14	Other 109 Cities	358
Total		795

5.2.4 Distribution by Contributing Institutions: An analysis of data on contributing institutions indicate that the total output came from 293 academic and research institutions located in different parts of India and world. Table 4 lists top seven institutions which contributed 9 or more papers. These seven institutions contributed 162 (21%) of the papers discussed at the conference. The remaining 633 (79%) of the papers were contributed by 286 institutions located in different parts of the country. Among these institutions, as many as 188 institutions contributed only one paper and the rest contributed two to eight papers. Among the top seven institutes, the highest (69) were contributed by DESIDOC, the organizing institute. The share of DESIDOC was about 8.5% of the total contributions. It was also noticed that of the 660 papers, 51 papers were contributed by individual authors who were not associated with any institutions and collaborated with authors from some other institutions.

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Table 4: Distribution of contributions by Institutions

Sl. No.	Institution	No. of papers
1	Defence Scientific Information and Documentation Centre, Delhi	69
2	Indian Institute of Technology, Delhi	33
3	Ganga Institute of Technology and Management, Jhajjar	24
4	PDM college of Engineering, Bahadurgarh	12
5	Institute of Nuclear Medicine and Allied Sciences, Delhi	11
6	Pandit Ravi Shankar Shukla University, Raipur	09
7	Banaras Hindu University	09
Total		167
Other 286 institutes		628
Grand Total		795

5.2.5 Authorship Pattern of Contributions: Studies of authorship pattern mainly deal with the kind of authors and the pattern of collaboration among them. An author may publish a paper independently or he/she may collaborate with one or more authors to bring out a publication. In recent years, maximum research is being carried out in collaboration. The extent of collaboration depends on the number of participants involved in the work. Collaboration is high in science, technology and medicine than that in social sciences and humanities. For the present study, the publication data was grouped into four categories. These were single authored, two authored, multi-authored (papers with 3 or 4 authors) and mega authored papers (papers with > 4 authors). Table 5 gives the details about the authorship pattern. It indicates that more than half of the presentations made were single authored, followed by two authored contributions. The share of mega authored papers was the least. Further analysis of data indicates that there were eight authors in three papers and nine authors in two papers. Thus, analysis of authorship of contributions reveals that contributions of single author papers are more than those with two or multi or mega authored papers.

Data was also analyzed to identify the contributions made by female authors. Total 660 papers were contributed by 1278 authors. Of these, 322 (25.2%) were female authors and the rest 956 (74.8%) were male authors. Thus, the data indicates that a significant number of female authors are involved in popular science writing in Hindi. Highest (37) number of female authors were in the category of contemporary science followed by role of science and technology in global development (32) and present scientific research (31).

Table 5: Authorship Pattern of Contributions

Sl. No.	No. of author(s)	Total no. of contributions	Percent
1.	Single authored papers	339	51.4
2.	Two authored papers	161	24.4
3.	Multi authored papers (3 and 4 authors)	129	19.5
4.	Mega authored papers (more than 4 authors)	31	4.7
Total		660	100

6. Conclusion: The international seminar on “The Role of Science and Technology in Global Development” organized by Defence Scientific Information and Documentation Center (DESIDOC) of the Defence Research and Development Organization (DRDO) from 5 to 7 December 2013 received 700 articles/research papers from 20 different countries. Of these, 660 were selected for oral or poster presentation. The present bibliometric analysis of the conference papers indicates that academic institutions (universities/colleges) contributed the

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highest number of papers followed by Defence Research and Development Organization. DRDO contributed a large number of papers as it was the organizing agency of the conference. The share of these two performing sectors was about 52% of the total contributions. Analysis of geographical distribution of contributions shows that scientists from abroad contributed 35 papers and the rest were contributed by scientists from India. Among the states, Delhi made the highest contributions followed by the state of Uttar Pradesh and Haryana. Among the cities also Delhi's share was highest followed by Jajjar and Pune. Delhi contributed more papers than any other city, because it was the venue of the conference. Most of the contributions were made by Hindi speaking states. However, Maharashtra, Karnataka and Gujarat were three non Hindi speaking states that contributed significantly. Among the institutions, Defence Scientific Information and Documentation Centre, the organizer of the seminar made the highest number of contributions followed by contributions from IIT New Delhi and Ganga Institute of Technology and Management. The pattern of authorship indicate that about half (51.4%) of the papers were single authored. Women scientists authored about 25% papers and the rest were contributed by male scientists. Among the subjects highest 62 number of papers were presented on the topic of Hindi in Today's India.

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