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Scientometric Analysis of Wind Power Research in India: A Case Study

Mr. P. Kanagavel	Scientist, Centre for Wind Energy Technology (C-WET), An Autonomous R&D Institution under the Ministry of New and Renewable Energy, Government of India. Velachery, Tambaram Main Road, Pallikaranai, Chennai - 600 100.
Dr. S. Gomathinayagam	Executive Director, Centre for Wind Energy Technology (C-WET), An Autonomous R&D Institution under the Ministry of New and Renewable Energy, Government of India. Velachery, Tambaram Main Road, Pallikaranai, Chennai - 600 100.
Dr. R.U. Ramasamy	Librarian, SACS M.A.V.M.M Engineering College, Madurai -625 301
Dr. S. Srinivasaragavan	Professor and Head, Department of Library and Information Science, Bharathidasan University, Tiruchirappalli – 620 024.

ABSTRACT

The investigation is a Scientometric analysis of research productivity in Wind Power and a sum total of 325 records were obtained from the Web of Science for 5 calendar years spanning from 2008 to 2012. The study gives an analytical view of the research literature output in Wind Power research in context of the India by language and forms of publications and prolific authors.

KEYWORDS: Wind Power, Scientometric, India literature output, citation.

OBJECTIVES OF THE STUDY

In this study the Wind Power research literature for the period 2008 to 2012 is analyzed by Scientometric method from Indian context. The main objectives of the present study are as follows:

1. The quantitative growth of articles by volume
2. The year wise distribution of length of articles
3. The authorship pattern of contribution
4. The ranked list of most prolific contributor & most productive institutions
5. The overall form wise distribution of citations
6. The extent of author self-citation in articles

METHODOLOGY

The data has been compiled from online journal articles. For each article following data have been noted: Name of the Authors, Number of Authorship, Number of References, Authors Geographical Affiliation, Length of Articles, Sources of Citations, Journal Self-Citation, Author Self-Citation and other data required for the study. All the necessary information are compiled, recorded, tabulated and analyzed for making observations as indicated in the objectives of the study.

DATA COLLECTION

The prime key used for search and download was *Wind Power* besides the publication date restricted to the years of coverage, year by year. Subsequently relevant keywords identifying each of the fields were used for further sorting through indigenously developed software. The data captured was subjected to data cleaning operation and deletion of duplicate records, thereby ensuring a perfect set of data required for the study.

RELATIVE GROWTH RATE

The relative growth rate and doubling time model by Mahapatra to examine the growth rate of papers published and weightage has been given to the scientists of engineering science.

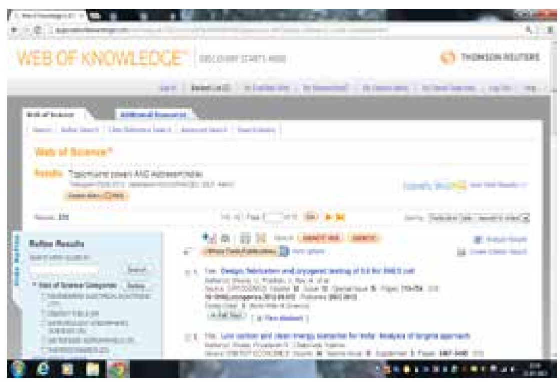

Figure 1 Snapshot of Search Result Page

The relative growth rate is increased in the number of publications or pages per unit of time. A specified period of interval can be calculated from the following equations.

$$R(1\text{-}2) = \frac{W2 - W1}{T2 - T1}$$

Where R (1-2) is mean relative growth rate over the specified period of interval.

W1 = LogW1: (Natural log of initial number of Publications/pages)

W2 = LogW2: (Natural log of final number of Publications/pages)

T2 – T1 = the unit difference between the initial time and final time.

The relative growth rate for both publications and pages can be calculated separately.

Therefore,

R (a) = Relative growth rate per unit of publications, per unit of time (Year);

R (b) = Relative growth rate per unit of pages, per unit of time (Year).

SUGGESTIONS FOR FUTURE STUDIES

The study revealed a positive growth Wind Power, though the annual turnover counts seemed small in the context of large Engineering Education system and available vast workforce, author productivity, International Collaboration, the absence of participation by leading institutions of technology in Wind Power research and absence of prolific authors in Wind Power.

Figure -2 Snapshot of Analysis Result Page

Table – 1
Year wise Distribution of Research Literature in Wind Power

S. No	Publication Year	India Records		
		Records	TLCS	TGCS
1	2008	39	40	490
2	2009	76	35	511
3	2010	68	12	405
4	2011	75	9	180
5	2012	67	1	60
Total		325	97	1646

Table - 1 displays the year-wise distribution of research productivity in Wind Power for a period of 5 years from 2008 to 2012. The total Indian publication count is found to be 325 and the maximum output occurred in the year 2009 numbering 76 records and 511 Total Global Citation Score (TGCS) of the total output.

Table – 2
Growth Rate of Wind Power Research Literature: India Output

S. No	Year	Count	Growth rate
1	2008	39	
2	2009	76	0.95
3	2010	68	-0.11
4	2011	75	0.10
5	2012	67	-0.11
Total		325	0.83

Table - 2 displays the annual growth rate of India literature output in wind power. It is found that the growth rate was at a maximum in the year 2009 and at its minimum in 2010 and 2012. In an overall view the average annual growth rate of wind power research at the India level was found to be 0.21.

Table – 3
Distribution of Language of Publications

S.No	Language	India Records		
		Records	TLCS	TGCS
1	English	325	97	1646

Table - 3 reveals the language of publications. The research literature output in wind power during the period of coverage was found to be in only one language, English was predominant with 325 for Indian count.

Table – 4
Source Wise Distribution of Literature of Wind Power

S.No	Document Type	India Records		
		Records	TLCS	TGCS
1	Article	286	75	1191
2	Review	27	17	402
3	Article; Proceedings Paper	11	5	53
4	Editorial Material	1	0	0
Total		325	97	1646

Table - 4 indicates the document wise distributions of publications on wind power. Those documents are classified into 4 categories according to the nature of publication. The data from the table - 4 revels that most prevalent form of publication is journal article with India were 325 records. Note as a source of Article (286 records) take first place, followed by Review (27 records), Article; Proceedings Paper (11 records) and Editorial Material (1 record).

Table - 5
Top 10 Research Institutions in India

S.No	Institution	Records	TLCS	TGCS
1	Indian Institute of Technology	73	36	333
2	National Institute of Technology	26	7	74
3	Indian Institute of Science	19	16	326
4	Indian Institute of Technology, Delhi	18	6	59
5	Anna University	14	2	29
6	Indian Institute of Tropical Meteorology	11	0	17
7	Motilal Nehru National Institute of Technology	8	2	26
8	Jadavpur University	6	1	18
9	National Atmospher Res Lab	6	1	18
10	Vikram Sarabhai Space Centre	6	0	19

Table - 5 provides the number of institutions in India, where the contributions originated. It is found from the table -5 that, 73 publications were from Indian Institute of Technology, followed by 26 publications from National Institute of Technology.

Table 6
Distribution of Top 10 Authors

S.No	Author	Records	TLCS	TGCS
1	Singh B	25	17	70
2	Sharma S	8	1	5
3	Kedare SB	7	8	63
4	Sharma RP	7	0	8
5	Kasal GK	6	15	42
6	Murthy SS	6	0	10
7	Prakash R	6	3	44
8	Ranganathan	6	10	51
9	Bandyopadhyay S	5	6	37
10	Fernandez E	5	3	74

Table - 6 provides the list of authors in a ranked order based on authorship share when their collaboration also is taken into account against just the incidence frequency of their (author) names. Singh B, who participated in a maximum of 25 publications and placed in the first rank according to author name frequency, Sharma S, with a publication count of 8, who were originally in the second rank in India and Kedare SB and Sharma RP with each publication count of 7, they were originally in the third rank in rank in India.

CONCLUSION

In the context of Research Manpower and the development of Science and Technology and its leadership qualities in R & D in the Indian context of the quantum of publications, Indian has created Knowledge Commission with separate working groups for various areas of higher education including the one for Engineering Education. Scientometric researchers are exploring features of information processes in scientific research but are far from finding the solution to all problems. Scientific research is a social obligation; therefore the possibility for a description by quantitative methods has more limitations in the field of Wind Power sciences.

The analysis of the present study further reveals the application of statistical techniques and tools and the generation of number of formulae and equations that facilitate future researchers to test. The forecast is not only in measuring the field of science and technology but also in other fields. This Scientometric quantitative analysis can help to measure the competitive position and assess the efforts required to preserve or to improve scientific research potential. The present study also appears to be a forerunner on the above said fact.

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