

A Bibliometric Analysis of Research Publications of Indian Institute of Science Education and Research, Thiruvananthapuram

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Abstract

Bibliometric analysis is presently used for evaluating the qualitative and quantitative interest in a very specific field through the analysis of publications. This paper brings-out the bibliometric analysis result of research publications of Indian Institute of Science Education and Research (IISER), Thiruvananthapuram, for the period 2008-2013. During the period of study, it analyzed 157 research publications from the 76 journals. Further, it examines year-wise publications, journal wise distributions, document wise distribution of papers, productivity of faculty and researchers, further, findings of the study and conclusion are shown related to data analysis.

Keywords: *Bibliometric, research publications, IISER-TVM, web of science*

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INTRODUCTION

The knowledge revolution in present century is reflecting the rapid growth of information technology. In the competitive World, strengthening Research and Development (R & D) is very important role to any country. India's Science and Technology Policy (STP) of 2003 brought Science and Technology together and emphasized the need for investment in R & D. India has declared 2010-2020 as the "Decade of Innovation." The term bibliometric analysis is a technique to measure the scientific productivity in general. It is a quantitative and qualitative study of publication productivity in various types namely, publication pattern, authorship pattern, degree of collaboration, citation analysis, impact factors, h-index, and networks of scholarly communications etc. Bibliometric analysis in library and information sciences, measuring and statistics of research publications in a particular topic [1], field [2], institute [3] or country [4]. Methods are used to investigate research trends [5-7]. Bibliometric analysis is one of the tools to design the collection development policy of the library and information science professionals' for identifying the more referred journal(s) of its research community by their

publications, procuring the specialized books in such areas, subscribing the new journals etc., The wealthy resources management will also motivate the researchers to provide more outputs such as new inventions, publications etc hence the bibliometric analysis of research publications of IISER, Thiruvananthapuram, for the period 2008-2013 will be useful to LIS professionals and also researchers.

IISER, THIRUVANANTHAPURAM (IISER-TVM)

Indian Institute of Science Education and analysis, Thiruvananthapuram (IISER-TVM) is devoted to scientific research and science education of international standards. IISERs were established by the Ministry of Human Resource Development, Government of India, started functioning in August 2008.

The institute aims to produce prime quality education in modern science, desegregation it with outstanding research at the undergraduate level itself, and develop a spirit of research across disciplines. IISER-TVM is an autonomous establishment awarding 5 year BS-MS degree additionally to Ph.D. degrees in Biology, Chemistry, mathematics, Physics and inter-disciplinary areas.

LITERATURE STUDY

Bibliometric ways are accustomed live scientific progress in several disciplines of science and engineering and are a common research instrument for systematic analysis [8]. Since Narin et al. initial planned the conception of “evaluative bibliometrics” [9], several scientists have tried to analysis trend within the publication outputs of nations, analysis institutes, journals and subject class [10], the citation analysis by Cole and also the peak year citation per publication [11, 12].

Jeevan and Gupta (2002) have analyzed the contribution and impact of Indian Institute of Technology, Kharagpur by suggesting a strategy the quantitative profile of an exploration cum teaching institute, with a view to induce plan regarding its performance an effect [13]. Equally, Singh et. al. (2005) studied the research contribution and impact of Indian Institute of Technology, Roorkee from 1993 to 2001 using a variety of bibliometric ways, together with publication and citation analyses [14]. Bonnevie (2003) investigated a multifarious portrait of the Journal of Information Science, targeted on the half-moon of the twentieth century. The areas of study included the visibility of the journal in databases, the pattern of authorship and self-citation, internalisation and scientific impact [15]. The study revealed that 2,140 JIS publications within the SSCI and LISA, with 1,228 (57.4%) in SSCI and 912 (42.6%) in LISA, respectively. Mulla and Chandrashekara (2011) known for various bibliometric indicators of 2253 articles revealed industrial and trade literature throughout the period of 2002–2006. Database of Indian Science Abstract (ISA) was the most prominent source for this study and it was revealed that the average publications of each year is 451, more number of articles were revealed throughout 2004 to 2006 i.e., 1690 [16]. Authorship trend shows that, maximum numbers of 964(42.78%) papers were contributed by the corporate bodies. The degree of collaboration in industrial and trade literature was 0.61. Within the country wise contribution of documents, India contributed a lot of documents, i.e., 69.86% of the whole publications. Within the state-wise contribution of documents geographical region stands first with 323(14.34%). whereas the

ranking of journals “Indian Journal of Fiber and Textile Research” stands first rank with 327(27.88%) articles and within the company bodies Procter and Gamble Company stands first with 172(17.77%) documents.

Tsay (2008) explored the connection between Journal of the American Society for information science & Technology (JASIST) and different disciplines by drawing citation information from references of articles of JASIST in 1980, 1985, 1990, 1995, 2000 and 2004 [17]. The results of this study unconcealed that the production rate of JASIST literature doubled and also the average range of references cited per paper is additionally raised to 2-3 times during the period of about 25 years. Singh (2013) during a bibliometric analysis of the Chinese Librarianship: an international Electronic Journal (2009–2012) found that within the year 2012 variety range of papers revealed compared to different years, India is that the most prolific country and among all the contributors most are associated with non-teaching professionals [18]. Equally another study was administrated by Mulla and Dhanamjaya (2014) on SRELS Journal of Information Management (SRELS-JIM) from 2000 to 2009; the findings of the study unconcealed numerous aspects of the characteristics and patterns of contributions of the journal [19]. Mulla (2012) analysed 998 articles of on scientific discipline and scientometrics were appeared in several journals throughout the period of 2005–2009 [20]. The study unconcealed that, most researchers most popular to publish their research results in journals; in and of itself 91.98% of articles were revealed in journals. More numbers (329, 32.97%) of articles were published in 2009 and additionally more examined year wise distribution of articles, distribution of varieties of documents, length of the papers, authorship pattern, degree of collaboration among authors, degree of collaboration among co-authors, degree of collaboration among totally different class of authors, rank wise distribution of collaborators, institution wise distribution of articles, country wise distribution of contributions, state wise distribution of contributions, journal wise distribution of articles.

Chaurasia et al. has analyzed the research productivity of IIT, Delhi using Web of Science database during 2001–2010 [21]. They observed that out of total 6109 publications, ‘Journal Articles’ were found most favored document types with 5731 and IIT, Delhi researchers mostly preferred foreign journals to publish their articles. The study shows that collaborative work has been higher compare to single author contributions. Velmurugan and Radhakrishnan (2014) conducted a study on publication research trend on “IETE Technical Review Journal” during 2007–2012 [22]. Out of 255 contributions the maximum 53 number of contributions in the year 2012 (20.78%) and the Degree of collaboration was high. The study shows that the multi-authored contributions was high with 211(82.74%) while single author contributed 44(17.26%) and majority of the contributions from India 45.09% followed by China and Korea with 10.99% & 9.8%. In the span of six years the relative growth rates (RGR) has increased from 2007 (0.76) to 2012 (1.96%). The year 2012 & 2011, vol.29 and vol.28 marked higher citations viz., 1998 & 1983.

OBJECTIVES OF THE STUDY

The present study is own an comprehensive study of the publications of Indian Institute of Science Education and Research, Thiruvananthapuram, for the period 2008–2013 for analyzing with the subsequent objectives:

- To measure the development of research productivity of IISER-TVM;
- To know the year wise distribution of papers and citations;
- To identify the collaboration with other institutions;
- To identify the foremost prolific researchers throughout the period;
- To know the most preferred journals of IISER-TVM researchers;
- To analyze the geographical distribution of publications;
- To identify the document wise distribution of publications;

METHODOLOGY

The bibliometric study covers research publications of various departments of IISER-

TVM. The publication data of the Institute has been drawn from Web of Science database for the period 2008–2013. It accesses the Institute contribution and impact of research in different field of science and technology and the keywords used as address and the year of publications 2008–2013 selected as the time span of study [23, 24–26]. During the study period, 157 research papers in different disciplines retrieved and matched with IISER-TVM, as author’s affiliation/address. Aspects referring to type of document, subject category, journal, year, etc., were analyzed.

ANALYSIS AND DISCUSSION

Details of Publication

IISER-TVM published a total of 157 research papers in different disciplines of science and technology during 2008 to 2013, as seen from the Web of Science database. Table 1 and Figure 1 gives a detailed overview of year wise publications with their citations as 157 papers are totally cited 2133 times, with an average citations per paper is 13.58.

Table 1: Year-Wise Publications and Citations.

Sl. No.	Year	No of Publications	Citations
1.	2008	3	17
2.	2009	15	146
3.	2010	16	262
4.	2011	30	450
5.	2012	41	986
6.	2013	52	272
Grand Total		157	2133

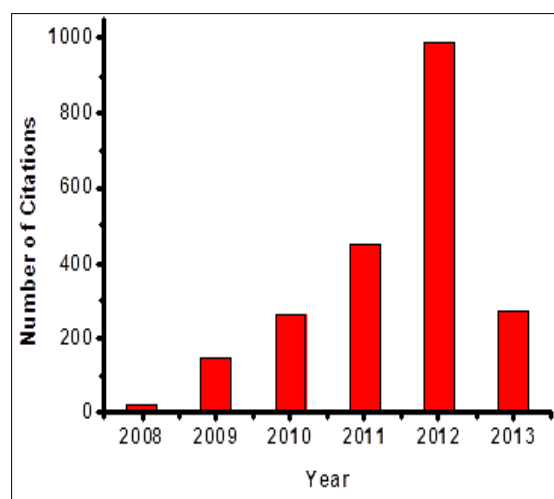


Fig. 1: Citations in Each Year.

Annual Distribution of Publications

Table 2 and Figure 2 shows that a total of 157 research publications were published during the period of 2008–2013 by the researchers of IISER-TVM with an annual average growth rate of 111%. Out of 157 publications in specific period, the maximum number of 52 (33.12%) papers are published in 2013 followed by 2012 (26.12%) 2011 (19.11%) 2010 (10.19%) and 2009 (9.55%) and the lowest numbers of articles were published in the year 2008 with 3 (1.91%).

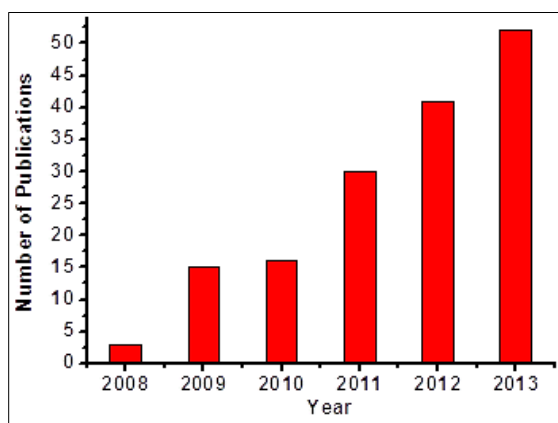


Fig. 2: Published Items in Each Year.

Most Favored Journals of Publications During 2008–2013

Table 3 presents a list of top 8 ranking Source titles with their total no. of publications where the faculty and researchers of IISER-TVM during 2008 to 2013, The list shows the source title up to 8 ranks which are proved in this investigation altogether there were 76 journals represented by 157 papers. Again it is found that “Journal of Physical Chemistry C” have contributed highest 11 (7.01%) articles and secured the first rank. The “Journal of Physical Chemistry Letters” in second position with 10 (6.37%) articles and “Journal “Physical

Review B” placed in third with 9 (5.72%) articles. 12 journals published each 2 articles and 49 journals published each one article.

Author Productivity

Table 4 shows that during the period of 2008–2013, a total of 2,717 authors have contributed 157 publications with an average contribution of authors per paper is 17.31 and 0.06 is the productivity per author.

Most Prolific Authors

Table 5 reveals the rank list of most productive authors based on their numbers of contributions indexed in Web of Science. The most prolific authors during the period under study Datta, A with 33 (21.02%) contributions stood at the 1st place, followed by Jemmis, ED (22, 14.01%), Sureshan, KM (14, 8.92%), Jose, D (7.64%), Hariharan, M (12, 7.64%), Shaji, A (10, 6.37%), Nath, R (10, 6.37%), Thomas, KG (8, 5.10%), Nijamudheen, A (8, 5.10%) and others.

Geographical Distribution of Publications

Geographical distribution analysis with 157 research publications of IISER-TVM carries the collaboration with foreign countries; Fully 157 publications were contributed by authors from India (IISER-TVM researchers). The co-authors from the United States have contributed 28 (17.83%) articles, joint authors from Germany have contributed 20 (12.74%) and authors of England have contributed 16 articles (10.19%) authors from Italy have contributed 7 articles (4.46%) Lowest number of collaborative contributions from Ukraine, Turkey, Thailand, South Africa, Slovakia, Singapore, etc only 1 (0.64%) articles each (Table 6).

Table 2: Annual Distribution of Publications.

Sl. No.	Year	No of Publications	% of 157	Annual Average Growth Rate of Percentage %
1.	2008	3	1.91%	
2.	2009	15	9.55%	400
3.	2010	16	10.19%	7
4.	2011	30	19.11%	88
5.	2012	41	26.12%	37
6.	2013	52	33.12%	27
Grand Total		157	100%	111%

Table 3: Most Productive (CORE) Journals during 2008–2013.

Sl. No.	Contributing Journals	No. of Articles	Rank	Percentage %	Cumulative No. of Articles	Cumulative Percentage %
1	Journal of Physical Chemistry C	11	1	7.01%	11	7.01%
2	Journal of Physical Chemistry Letters	10	2	6.37%	21	13.38%
3	Physical Review B	9	3	5.72%	30	19.10%
4	Journal of the American Chemical Society	8	4	5.10%	38	24.20%
5	Physical Chemistry Chemical Physics	6	5	3.81%	44	28.01%
6	Journal of Physical Chemistry A	5	6	3.18%	49	31.19%
7	Inorganic Chemistry	5	6	3.18%	54	34.37%
8	Chemical Communications	5	6	3.18%	59	37.55%
9	Angewandte Chemie International Edition	5	6	3.18%	64	40.73%
10	Journal of Physical Chemistry B	4	7	2.54%	68	43.27%
11	Journal of Cosmology and Astroparticle Physics	4	7	2.54%	72	45.81%
12	Physical Review D	3	8	1.90%	75	47.71%
13	Physical Review A	3	8	1.90%	78	49.61%
14	Journal of Organic Chemistry	3	8	1.90%	81	51.51%
15	Chemphyschem	3	8	1.90%	84	53.41%
16	12 journals with 2 articles	24	-	15.25%	108	68.66%
17	49 different journals with 1 article	49	-	31.34%	157	100%
Total		157		100%		

Table 4: Author Productivity during 2008–2013.

Sl.No.	Year	Total No of Papers	Total No of Authors	Total AAPP	Total PPA
1	2008	3	5	1.67	0.60
2	2009	15	37	2.47	0.41
3	2010	16	145	9.07	0.11
4	2011	30	96	3.20	0.32
5	2012	41	1360	33.17	0.03
6	2013	52	1074	20.66	0.05
Total		157	2717	17.31	0.06

*Notes: Average Authors Per Paper (AAPP) = Number of authors/ Number of papers.
Productivity per author (PPA) = Number of papers/ Number of authors.*

Document-Wise Distribution of Publications

During the 6 years period (2008–2013) IISER Thiruvananthapuram researchers have produced a total of 157 publications [23]. The highest numbers of publications were 147 Journal articles (93.63%), followed by 7seven reviews (4.46%), two proceedings (1.27%) and one as letter (Table 7).

FINDINGS

The following are some key findings of the present study:

- Altogether, 157 publications have been published by authors affiliated with IISER-TVM and indexed in Web of Science during the period of 2008–2013.
- The publication range of the centre ranges between 3 papers to 52 publications during the period with an annual average growth rate percent of 111%.
- A total of 2,717 authors have contributed to 157 publications with an average of 17.31 authors per paper and 0.06 is productivity per author.

- Journal of Physical Chemistry C is the most preferred journal of IISER-TVM researchers with 11 (7.01%) papers, followed by Journal of Physical Chemistry Letters with 10 (6.37%) papers and Physical Review B with 9 (5.72%) papers.
- Prof. Datta, A with 33 (21.02%) contributions stood in first position followed by, Prof. Jemmis, ED with 22 (14.01%) papers, Prof. Sureshan, K.M with 14 (8.92%) papers.
- The finding shows that researchers are more likely to collaborate with authors of United States, Germany, England, Italy, etc.

Table 5: Most Prolific Authors.

Rank	Name of the Contributor	No of Contributions N = 157	Percentage %
1.	Datta A	33	21.02%
2.	Jemmis E D	22	14.01%
3.	Sureshan K M	14	8.92%
4.	Jose D	12	7.64%
5.	Hariharan M	12	7.64%
6.	Shaji A	10	6.37%
7.	Nath R	10	6.37%
8.	Thomas K G	8	5.10%
9.	Nijamudheen A	8	5.10%
10.	Jissy A K	8	5.10%
11.	Ghosh S	8	5.10%
12.	Swathi R S	7	4.46%
13.	Shankaranarayanan S	7	4.46%
14.	Roy S	7	4.46%
15.	Rosenthal U	6	3.82%
16.	Mallick D	6	3.82%
17.	Lewis FD	6	3.82%
18.	Tsirlin A A	5	3.19%
19.	Shaijumon M M	5	3.19%
20.	Rosner H	5	3.19%
21.	Pai A	5	3.19%
22.	Geibel C	5	3.19%
23.	Cheriya R T	5	3.19%
24.	Beweries T	5	3.19%
25.	Baenitz M	5	3.19%

CONCLUSION

The present bibliometric study revealed that IISER-TVM has published 157 scholarly research publications in the field of science and technology for the period 2008–2013. Further, it examined and analyzed 157 articles and found that annual growth rate is an average 111%. And totally 2133 times cited

with an average of 13.58% citations per paper and h-index is of 18. The totals of 2717 authors have contributed to 157 publications with an average of 17.31 authors per paper and 0.06 is the productivity per author. The most prolific authors of the centre during the period of study are Datta, A with 33 (21.02%) contributions stood at the 1st place. However, the findings also show that IISER-TVM scholars are more likely to collaborate with authors from the United States, Germany, England, Italy, etc. This study enlighten the research productivity and collaborations of ISSER's fraternity and though this is short period of study experiences gained and it has given much confidence to make an in depth bibliometric study in the coming years of ISSER's research productivity.

Table 6: Geographical Distribution of Research Publications.

Rank	Name of The Country	Total Contributions (N = 157)	Percentage %
1	India	157	100.00%
2	USA	28	17.83%
3	Germany	20	12.74%
4	England	16	10.19%
5	Italy	7	4.46%
5	Australia	7	4.46%
6	Russia	6	3.82%
6	Canada	6	3.82%
7	Spain	5	3.19%
7	South Korea	5	3.19%
7	North Ireland	5	3.19%
7	Japan	5	3.19%
8	Wales	4	2.55%
8	Taiwan	4	2.55%
8	Sweden	4	2.55%
8	Scotland	4	2.55%

Table 7: Document-Wise Distribution of Publications.

Sl. No.	Document Type	Records	Percentage %
1.	Articles	147	93.63%
2.	Reviews	7	4.46%
3.	Proceeding Papers	2	1.27%
4.	Letter	1	0.64%
Total		157	100.00

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