

# Scientometric Analysis of Vikalpa: The Journal for Decision Makers (2008-2017)

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**Abstract** - This study aims to present a scientometric analysis of the journal titled "vikalpa: the journal for decision makers" for the period from 2008 to 2017. The present study was conducted with an aim to provide a summary of research activity in the current journal and characterize its most important aspects. The analysis covers mainly the year wise distribution of articles, category wise classification of papers, authorship patterns of papers, the degree of collaboration, most prolific contributions of papers, institution-wise distribution of contributions and geographical distribution of papers of the journal. The analysis showed that 325 papers were published in the journal of vikalpa: the journal for decision makers" for the period from 2008 to 2017. The maximum number of publication was recorded in 2014 (39 articles, 12.00%) while the minimum was in the year 2017 (21 articles, 6.46%). The authorship pattern was studied to determine the percentage of single and multiple authorship. It is observed from the study that a single author 114(35.08%) paper occupied the 2nd rank. Two author paper 132(40.62%) occupied in 1st rank. Three author paper 41 (12.62 %) occupied in 3rd rank and more than three author paper 38(11.69%) occupied in 4th rank. The study exposes that during 2008-17 the highest proportion of papers were by single authors 114 followed by papers with two authors 211, and more than three authors 325. Among the ten years of the study period, the highest degree of collaboration occurred in the year of 2012. The growth rate is 0.72 in 2008 and which decreased up to 0.07 in 2017. The mean relative growth rate for the periods of 2008 to 2017 the relative growth rate of 0.223. This study period resulted that the mean doubling time for total output 4.088 years. It is observed from the study that the highest number of contributors is belonging to India with 270 articles out of 325 total articles published and its percentage is 83.08 %.

**Keywords:** Bibliometrics, Scientometric Analysis, Authorship Pattern, Degree of Collaboration, Growth Rate, Doubling Time

## I. INTRODUCTION

Scientometric study is a branch of bibliometrics. It is an important research tool for understanding the subjects it aims at measuring the utility of documents and relationships between documents and fields. Scientometric is a type of research method used in the library and information science. It is an application of mathematical and statistical methods of various aspects of literature on a topic and is used to identify the pattern of publication authorship and secondary journal coverage with the objective of getting an insight into the dynamics of growth of knowledge. It provides tools for

the evaluation of scientific research. Scientometric those most scientific discoveries and research results eventually are published in the journal where they can be read and acted by other researchers. Scientometric analyses have attracted much attention within the past years. "Scientometrics" is a Russian invention. The term "naukometriya" for the quantitative methods of studying the development of science was suggested by Russian statistician Nalimov in 1966. The parameters measured at that time were the number of scientists, publications, institutions and the effectiveness of the scientific work. According to philosophical Encyclopedia, scientometric and the science of science, on the whole, was an important aid in the improvement of scientific organization and in the rational science planning. Scientometric is the study of measuring and analyzing science, technology, and innovation. The major research issues include the measurement of impact, reference sets of articles to investigate the impact of journals and institutes, understanding of scientific citations, mapping scientific fields and the production of indicators for use in policy and management contexts. In practice, there is a significant overlap between scientometric and other scientific fields such as bibliometrics, information systems, information science and science of science policy.

## II. REVIEW OF LITERATURE

This paper reviews a few studies conducted on the bibliometric study. The following is some of the related studies worthy of examinations.

Mamdapur, N., & Rajgoli, U. (2013) carried out a scientometric analysis of the journal scholarly communications in college and research libraries journal during the period of 1997-2011 and to study the key dimensions of its publication trends. For the analysis of he study volumes containing 15 volumes 90 issues have been taken up for evaluation. It is found contributions of articles to each volume of college & research libraries nearly consistent and on an average 32 articles have been published every year. Single authored articles are found to be the highest followed by two and three authored articles. The average degree of collaboration in college and research libraries is 0.57. The average author per article is 1.88 for 479 articles. Lotka's law is tested and confers to a

value of  $n=3.22$ . In all 12893 citations have been appended to 479 articles during the period 1997- 2011. Journals (59.95) are the top form of used by authors followed by books (17.32), (7.44) and reports (3.95). Ranked list of prolific authors and ranked list of journals is prepared and presented in respective tables. His study has topped the ranked list of journals with 1311 (16.96) citations.

Surulinathi, M., Balasubramani, R., & Kalisdha. (2013) carried out a scientometric analysis of Green Computing Research: A Scientometric Study. Journal of Advances in Library and Information Science their paper attempts to analyze the growth and development of Green Computing, as reflected in publication output covered by Web of Science online database during 1956-2011. Among these 42 countries, Germany has produced 270 (16.24 %) articles, and it occupies the first place of the continent. France and Italy have more than 200 articles produced in this field.

Sivanbkutty, V.S. (2014 August) carried out a scientometric analysis of research trends (2007-2013). In this study, they observed that year wise distribution of articles, author-wise contribution and authorship pattern. They, however, pointed out that the study may be vied as just starting points of scientometric analysis of a journal.

Vijayakumar, P. (2014 August) carried out a scientometric analysis of the journal 'Neurology India' (2002-2011). His study stressed that scientometric techniques had used extensively for distribution of contributions, authorship pattern, and degree of collaboration.

Dutt, Kumar., & Garg evaluated the research output in global dengue research by analyzing 2566 papers published from 1987 to 2008 and indexed by Science Citation Index. The results revealed a gradual rise in the quantum of output.

Dutt B., Kumar S & Garg K C. (2010) evaluated malaria vaccine research carried out in different parts of the world during 1972–2004 using different bibliometric The study examined the growth pattern of research output, its geographical distributions the profile of different countries in different subfields and pattern of citations using Google Scholar.

Gupta R., Gupta B M, Kshitij A & Bala A, (2014) analyzed the global publications output on cataract research during 2002-11 and found that the world publication output in cataract research consisted of 27053 papers during 2002-11, which increased from 2025 papers in 2002 to 3080 papers in 2011, witnessing an annual average growth rate of 4.89%. The average citation impact per paper registered by world publications was 6.94 during 2002-11, which decreased from 7.82 during 2002-06 to 5.21 during 2007-11.

Bhardwaj R K, (2014) the Indian output in glaucoma research during 2002-11 and found the Indian publications output in glaucoma research (1078 papers) during 2002-11

increased from 61 papers in 2002 to 207 papers in 2011, witnessing an annual average growth rate of 18.29 %. The average citation impact per paper registered by Indian publications in glaucoma research was 3.03 during 2002-11, which decreased from 3.87 during 2002-06 to 2.49 during 2007-11.

Bhardwaj R K, (2014) evaluated the global publication output on dengue during 2001-12 using data obtained from Scopus. The study revealed that there were 9618 publications within the period under study. During the period 2001-12, the annual growth rate was 13.4 percent, compared to 14.31 percent in the period 2001-2006, and 12.48 percent in 2007-2012. Bhardwaj<sup>10</sup> analyzed India's contributions to the research literature on dengue and found that India has one of the most prominent records in the world in terms of output of dengue articles and citations to them. Indians are frequently research collaborators with scientists from other countries affected by the disease, with a significant number of the resulting articles being published in Indian journals and subsequently well cited.

Zhang *et al.*, (2015) systematically analyzed the global research output on nonalcoholic fatty liver disease (NAFLD). The study reported that the publication on NAFLD grew slowly and entered into a highly developing period in the 21st century, especially in the last decade.

Ritu Gupta, Dhawan SM, Gupta BM (2017) Their paper examines 7818 world publications on global rabies research, as indexed in Scopus database covering the period 1999-2014. The global rabies research increased by 5.87% per annum and its citation impact averaged to 14.27 citations per paper. Top 15 most productive countries continued to dominate world rabies research through 1999-2014 both in terms of quality and quantity of research. Together they accounted for as much as 83.82% share of world total output during 1999-2014. Twelve of these top countries scored relative citation index (RCI) above the world average of 1: USA (1.74), U.K. (1.70), France (1.66), Switzerland (1.62), Germany and Netherlands (1.50 each), Australia (1.44), Japan (1.39), Thailand (1.35), Canada (1.31), South Africa (1.24) and Italy (1.08) during 1999-2014. Being a multidisciplinary topic, world rabies research is widely scattered across several disciplines. Medicine contributed the largest share 54.80%, followed by 7 other disciplines. The top 20 most productive organizations and authors engaged on rabies research respectively accounted for 40.94% and 21.42% share of publications output and 39.62% and 34.90% share of world citations during 1999-14. The world rabies research output is highly scattered across journals. Top 20 most productive journals barely accounted for 24.06% share of global rabies research. Less than 2 per cent of global rabies research papers (148) received 100 plus citations, cumulated 29160 citations, with an average of 197.03 citations per paper. These 148 highly cited papers involved the participation of 1003 authors and 502 organizations and were published in 85 journals. The USA contributed the largest number of highly cited papers

(89), followed by U.K. (32), France (20), Germany (11), Canada, Australia and Belgium (7 each), Thailand and Switzerland (6 each), Japan (5), Kenya (4), South Africa, Russia Federation and Tanzania (3 each), etc. For India, rabies research is not a top priority.

**III. SOURCE JOURNAL**

Vikalpa: The journal for decision is a quarterly peer reviewed journal published by the Indian Institute of Management, Ahmedabad since January 1976. Research articles published in Vikalpa are expected to have substantial original contribution to the body of knowledge in management or allied disciplines. Perspectives articles present a synthesis of the knowledge in a specific sub field of management offering valuable lessons to management practitioners and policy makers. Typically the perspectives call for action or rethinking by managers and policy makers in organizations. The perspective article need not necessarily be backed by original field research. The case feature of Vikalpa encourages authors to publish real life managerial decision contexts in the form of instructional cases for the benefit of the academia. The decision context could be centered on an organization or an individual. The case should present sample data to facilitate a rich analysis of the situation. Vikalpa publishes cases related to the various managerial sub disciplines such as business strategy, marketing, finance, organizational behavior and human resources management etc. each case should be accompanied by a detailed teaching note, which presents an in-depth analysis of the situation and data presented in the case by the author. Colloquium presents an intense debate among various stakeholders on a contemporary management issue where each of the stakeholders presents their view on the issue. Vikalpa encourages the publication of short review of recently released titles in management and allied disciplines.

**IV. OBJECTIVES OF THE STUDY**

1. To determine the year wise distribution of research publications.
2. To observe the authorship pattern.
3. To identify the ranking of authorship pattern.
4. To identify the proportion of single and multi - authored and degree of collaboration.
5. To find out relative growth rate and doubling time of publications
6. To find out the country wise distribution of publications.
7. To find out the top collaborative institutions.

**V. METHODOLOGY**

The data for the study was taken from the database Scopus, the largest abstract and citation database of peer-reviewed literature, scientific journals, books, and conference proceedings. Delivering a comprehensive overview of the world's research output in the fields of science, technology,

medicine, social sciences, and arts and humanities, Scopus features smart tools to track, analyze and visualize research. For this study, the volume 33-42 (2008-2017) was taken into consideration. Data were collected with adequate detail such as the title of the article, name of the contributors, and their address and affiliations details for each article. The collected data were analyzed for making observations.

**VI. LIMITATIONS OF THE STUDY**

Vikalpa: The journal for decision makers publishes in research articles that help to the research scholars, students did their projects and updates their latest development in their respective subjects. This study is limited for the period of 10 years starting from the year 2008 up to the year 2017.

**VII. RESULTS AND ANALYSIS**

TABLE I YEAR - WISE DISTRIBUTION OF RESEARCH PUBLICATIONS

S. No	Year	Volume Number	No of Issues	No of Articles	Percentage
1	2008	33	4	35	10.77
2	2009	34	4	37	11.38
3	2010	35	4	33	10.15
4	2011	36	4	31	9.54
5	2012	37	4	36	11.08
6	2013	38	4	38	11.69
7	2014	39	4	39	12.00
8	2015	40	4	32	9.85
9	2016	41	4	23	7.08
10	2017	42	4	21	6.46
Total		10	40	325	100

Table I shows that distribution of year wise articles published in Vikalpa: the journal for decision makers during the year 2008 – 2017. Out of 325 articles 35(10.77%) of them published in 2008. 37 (11.38 %) of them published in 2009. 33 (10.15 %) of them published in 2010. 31(9.54 %) of them published in 2011. 36(11.08 %) of them published in 2012. 38(11.69 %) of them published in 2013. 39(12.00%) of them published in 2014. 32(9.85%) of them published in 2015. 23(7.08 %) of them published in 2015. 21(6.46 %) of them published in 2017. It is evident from the table that the highest 39 (12.00 %) articles published in the year of 2014.

Table II indicates the year wise authorship pattern in the source journal. It is observed that totally 35 authors contributed for paper publishing in the year 2008. Totally 37 authors contributed to paper publishing in the year 2009. 33 authors contributed for paper publishing in the year 2010. Totally 31 authors contributed to paper publishing in the year 2011. 36 authors contributed to paper publishing in the year 2012. 38 authors contributed to paper publishing in the year 2013. 39 authors contributed to the years 2014. 32 authors contributed during the years 2015. 23 authors

contributed to paper publishing in the year 2016 and 21 authors contributed to paper publishing in the year 2017. It

is observed from the table more authors 39 (12.00%) contributed in the year of 2014.

TABLE II YEAR WISE AUTHORSHIP PATTERN AND THEIR PERCENTAGE

S. No	Year	Single Author	Two Authors	Three Authors	More than Three Authors	Total	Percentage
1	2008	13	13	3	6	35	10.77
2	2009	15	17	2	3	37	11.38
3	2010	11	14	2	6	33	10.15
4	2011	11	13	3	4	31	9.54
5	2012	22	9	1	4	36	11.08
6	2013	11	20	6	1	38	11.69
7	2014	12	18	6	3	39	12.00
8	2015	7	11	9	5	32	9.85
9	2016	5	10	5	3	23	7.08
10	2017	7	7	4	3	21	6.46
Total		114	132	41	38	325	100.00

TABLE III RANKING OF AUTHORSHIP PATTERNS

S. No	Rank	Authorship Pattern	No of Contributions	Percentage of Contribution	Cumulative Contribution	% of Cumulative Contribution
1	2	Single Author	114	35.08	114	35.08
2	1	Two Authors	132	40.62	246	75.69
3	3	Three Authors	41	12.62	287	88.31
4	4	More than Three Authors	38	11.69	325	100.00

Table III shows that ranking of the authorship pattern. It is observed from the table that single author 114 (35.08%) paper occupied in 2<sup>nd</sup> rank. Two author papers 132 (40.62%) comes in 1<sup>st</sup> rank. Three author papers 41 (12.62%) occupied in 3<sup>rd</sup> rank. More than three author papers 38 (11.69%) occupied in 4<sup>th</sup> rank of in this study.

TABLE IV YEAR WISE SINGLE AUTHOR VS MULTI AUTHOR CONTRIBUTIONS

S. No	Year	Single Author	Multi Authors	Total
1	2008	13	22	35
2	2009	15	22	37
3	2010	11	22	33
4	2011	11	20	31
5	2012	22	14	36
6	2013	11	27	38
7	2014	12	27	39
8	2015	7	25	32
9	2016	5	18	23
10	2017	7	14	21
Total		114	211	325

Table IV shows that a single author and multi-author contributions in the source journal. It is found that 114 papers are published by the single author and 211 papers are published by multi-author during the study period.

A. Degree of Collaboration

The degree of collaboration is defined as the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time. The formula suggested by Subramanyam is used in this study.

$$C = \frac{N_m}{N_m + N_s}$$

C = Degree of Collaboration  
 N<sub>m</sub> = Number of Multiple authors  
 N<sub>s</sub> = Number of single authors

TABLE V YEAR WISE DEGREE OF COLLABORATIONS

S. No	Year	Degree of Collaborations
1	2008	0.63
2	2009	0.59
3	2010	0.67
4	2011	0.65
5	2012	0.39
6	2013	0.71
7	2014	0.69
8	2015	0.78
9	2016	0.78
10	2017	0.67

Table V shows that the degree of collaborations in the source journal. Among the ten years of the study period the highest degree of collaboration occurred in the year of 2012.

**B. Relative Growth Rate**

The relative Growth rate and Doubling Time model was developed by Mahapatra and applied to examined the relative growth rate of research publications. The relative growth rate is increased in the number of publications or pages per unit of time and can be calculated from the following equations.

$$\bar{R}(1-2) = \frac{W_2 - W_1}{T_2 - T_1}$$

Where,  $\bar{R}(1-2)$  is mean Relative Growth Rate over the specified period

$W_1 = \text{Log } W_1$ : (Natural log of initial number of Publications / Pages)

$W_2 = \text{Log } W_2$ : (Natural log of final number of Publications / Pages)

$T_2 - T_1 =$  The Unit difference between the Initial time and Final time

The relative Growth rate for both publications and pages can

be calculated separately. Therefore,

$\bar{R}(a)$  = Relative growth rate per unit of time (Year)

$\bar{R}(p)$  = Relative growth rate per unit of pages, per unit of time (Year)

**C. Doubling Time**

From the calculation, it is found that there is a direct equivalence existing between the relative growth rates and doubling time. If the number of publications / pages of a subject double during the given period, then the difference between the logarithm of the numbers at the beginning and at the end of the period must be the logarithms of the number two. If one uses a natural logarithm, this difference has a value of 0.693. The corresponding doubling time for publications and pages can be calculated by using the following formula:

$$\text{Doubling time (Dt)} = \frac{0.693}{\bar{R}}$$

Therefore, Doubling time for publications Data  $\text{Dt}(a) = \frac{0.693}{\bar{R}(a)}$

Doubling time for pages  $\text{Dt}(p) = \frac{0.693}{\bar{R}(p)}$

TABLE VI RELATIVE GROWTH RATE AND DOUBLING TIME FOR PUBLICATIONS

Year	R.O/P	Cumulative O/P	W1	W2	R(a) W2-W1	Mean R (a) (1-2)	Doubling time Dt(a)	Mean Dt(a) (1-2)
2008	35	35	-	3.56	-	0.223	-	4.088
2009	37	72	3.56	4.28	0.72		0.96	
2010	33	105	4.28	4.65	0.38		1.84	
2011	31	136	4.65	4.91	0.26		2.68	
2012	36	172	4.91	5.15	0.23		2.95	
2013	38	210	5.15	5.35	0.20		3.47	
2014	39	249	5.35	5.52	0.17		4.07	
2015	32	281	5.52	5.64	0.12		5.73	
2016	23	304	5.64	5.72	0.08		8.81	
2017	21	325	5.72	5.78	0.07		10.37	

Table VI indicates that the relative growth rate and doubling time for publications of the source journal. It is clear that the growth rate of total research output is decreased gradually. The growth rate was 0.72 in 2008 and which decreased up to 0.07 in 2017.

The mean relative growth rate for the periods of 2008 to 2017 the relative growth rate of 0.223. This study period resulted in the mean doubling time for the total output of 4.088 years.

Table VII shows that country wise distributions of research articles published in the source journal during the period 2008 – 2017. It has been observed that most of the articles contributed from India. It is observed that highest number of contributors belong to India with 270 articles out of 325 total articles published and its percentage is 83.08 % and it is followed by the United States the publication of 28 articles with the percentage of 8.62%. Other countries like the United Kingdom 11 (3.38 %), Canada 3 (0.92%), Germany 2 (0.62%) are contributed respectively.

TABLE VII COUNTRY WISE DISTRIBUTIONS OF PUBLICATIONS  
(TOP 10 RANKED)

S. No.	Name of the Country	No of Contribution's	Percentage	Rank
1	India	270	83.08	1
2	United States	28	8.62	2
3	United Kingdom	11	3.38	3
4	Canada	3	0.92	4
5	China	3	0.92	5
6	France	3	0.92	6
7	Netherlands	3	0.92	7
8	United Arab Emirates	3	0.92	8
9	Australia	2	0.62	9
10	Germany	2	0.62	10

TABLE VIII TOP TEN COLLABORATING ORGANIZATIONS

S. No.	Name of the Organizations	No of Contribution's	Rank
1	Indian Institute of Management Ahmedabad	60	18.46
2	Indian Institute of Management Bangalore	19	5.85
3	University of Delhi	14	4.31
4	Management Development Institute Gurgaon	12	3.69
5	Indian Institute of Technology Delhi	10	3.08
6	Indian Institute of Management Lucknow	10	3.08
7	Indian Institute of Management	8	2.46
8	Indian Institute of Technology, Kharagpur	8	2.46
9	Indian Institute of Management Calcutta	8	2.46
10	University of Jammu	7	2.15

Table VIII shows that the top ten collaborating organization in the source journal. Indian Institute of Management, Ahmedabad has topped with 60 (18.46 %) publications; next Indian Institute of Management Bangalore with 19 (5.85 %) of publications; next University of Delhi with 14 (4.31 %) of publications; next Management Development Institute Gurgaon with 12 (3.69 %) of publications; next Indian Institute of Technology Delhi with 10 (3.08 %) of publications and University of Jammu with 7 (2.15 %) of publications respectively.

### VIII. FINDINGS AND CONCLUSION

1. The maximum amount of publication was recorded in 2014 (39 articles, 12.00%) while the minimum was in the year 2017 (21 articles, 6.46%).
2. The authorship pattern was studied to determine the percentage of singles and multiple.
3. It is observed from the study that single author 114(35.08%) papers occupied in 2<sup>nd</sup> rank. Two author paper 132(40.62%) occupied in 1<sup>st</sup> rank. Three author paper 41 (12.62 %) occupied in 3<sup>rd</sup> rank and more than three author paper 38(11.69%) occupied in 4<sup>th</sup> rank for this study.

4. The study exposes that during 2008-17 the highest proportion of papers were by papers with single authors 114 followed by papers with two authors 211 and more than three authors 325.
5. Among the ten years of the study, the highest degree of collaboration occurred in the year of 2012.
6. It is observed from the study that the highest number of contributors is belonging to India with 270 articles out of 325 total articles published and its percentage is 83.08 %.
7. The growth rate was 0.72 in 2008 and which decreased up to 0.07 in 2017. The mean relative growth rate for the periods of 2008 to 2017 the relative growth rate of 0.223. This study period resulted from the mean doubling time for the total output of 4.088 years

It should be highlighted that the articles are the key method of communication by researchers, supplying a primary indication on the quantum associated with work carried out indifferent. The Scientometric method is used for various purposes such as identification of different scientific indicators, analysis of scientific results and predicting the potential of a field. This work presents an analysis of Vikalpa: The journal for decision makers over a ten period (2008-2017). The journal has published 325 papers during

the period of study. In future we plan to investigate the influence of the collaboration degree, the number of co-authors and the forms of documents to the citations and therefore, on the impact factor of the journal. Journal only publishes peer - reviewed quality of management research articles, review articles, short papers, and short notes, research letters are also published in the corresponding section after peer - reviewed.

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