A Bibliometric Analysis of the Journal "Scientometrics" (2008-2017): A Study based on Web of Science

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Abstract

The present study reports the results of bibliometric analysis of the journal "Scientometrics" during 2008-2017. The required data retrieved from web of science database. The related literature carried out and studied from various journals. The main objectives of the study is to identify the year wise distribution, to find out year wise authorship pattern of the source journal, to list out the top ten prolific author wise distribution, to identify the relative growth rate and doubling time, to calculate the exponential growth rate, to determine the country wise distribution, to find out the institution wise distribution, to categorized type of document wise distribution, to list out keyword wise distribution. The results are reported based on the objectives.

Keywords: Bibliometrics, Scientometrics, Quantitative analysis, Library and Information Science.

Introduction

Bibliometrics is one of the important research fields in library and information science subject. It is an emerging research area in the Library and Information Science field. The term "bibliometrics" is coined from two words "biblio" and "metrics". The word "biblio" is derived from the combination of a Latin and Greek word "biblion" means a book or paper, metrics indicates the science of meter i.e. measurement. Alan Pritchard (1969) is known as founder of bibliometrics who the person was to derive the first definition of bibliometrics as, "the application of mathematical and statistical methods to books and other media of communication". Bibliometrics is a quantitative study of different aspect of literature used to identify the publication pattern like authorship, length of the papers, geographical distribution, growth rate and citations and so on used to know coverage of journal to achieve insight into the dynamic growth rate of awareness in the specific subject. Bibliometrics studies are lead to develop subscription policies and collection development. The majority of the bibliometric studies are undertaken to evaluate the research output of an institution,

organization, publications of particular subject or field, research results published in a particular journal or any other similar activity which is confined to literature or research growth and its evaluation through quantitative techniques published during a particular period.

Source Journal "Scientometrics"

"Scientometrics" is an international journal, for all quantitative aspects of the Science of Science, communication in Science and Science policy. The journal "Scientometrics" first volume was published in 1979. There are 114 volumes were published Up to 2018. There are 40 volumes, 120 issues and 2814 articles were published during 2008-2017. The journal "Scientometrics" publishes real things, short communications, research reports, review reports and letters to the editor and book reviews on Scientometrics. The journal covered the topics are results of research concerned with the quantitative features and characteristics of science. Emphasis is laid on investigations in which the development and mechanism of science are studied by means of statistical/mathematical methods. The journal "Scientometrics" jointly published by Academia Kiado (Budapest) and Springer. The present study focuses on bibliometric analysis of the Journal "Scientometrics" during the year 2008-2017.

Review of Literature

1. Alamelu, J. (2017) made an analytical study of two journals namely Annals of Library and Information Studies and DESIDOC Journal of Library & Information Technology. There are 371 articles found in the ALIS journal and 542 articles found in the journal DJLIT from 2006 to 2016. In ALIS highest number of 43(11.59%) articles published in the year 2010. Similarly in DJLIT highest number of 65(11.99%) articles published in 2013. Comparing of both two journals its clearly known most of the articles published with double authors. The author also found that depth subject of articles in both journals. In ALIS journal 990 (14.18%) citations in 2010 and in DJLIT 973 (13.50%) citations in 2013. From 2006 to 2016 the number of citations ups and down.
2. Kanchan Dinkar Desai (2014) carried out the research on 'Bibliometric analysis of DESIDOC Journal of Library and Information Technology (DJLIT) during 2012". The study reveals various facts such as issue-wise distribution of papers, subject-wise distribution, authorship pattern, reference sources, length of the papers, special issues, institute-wise distribution, country-wise distribution, major contributors, research method/type & average number of reference per paper, etc.,. Totally 65 articles were published during research period. There are 10.77% of articles were published related to open source followed by digital preservation 9.23% and so on. Form the research analysis majority (more than one author's were published 64%) of the author's were published their article in collaborative nature. Online resources are top most resources used by

28.85% of the authors for their research/study. And also the researcher found that facts about length of the paper, special issues, institution-wise distribution, country-wise distribution and major contributors.

3. Nageswara Rao, K. Rajeev Kumar Sharma, Girija Devi, S. and Muralidhar, S. (2014) jointly made an article Bibliometric Analysis of the Journal of Propulsion and Power (1985-2013). There are 4047 articles were published during 1985-2013. There are 194 articles were published in 1992 which is highest and 81 articles were published in 1981 which is lowest. Out of 4047 articles 1330 articles published by two authors and 1098 articles were published by three authors. Form the analysis there are 1025 institutions contributed to the source journal. It is found that out of 4047 article there are 2672 articles were produced by USA.
4. Alka Bansal (2013) analyzed 391 published articles in the DESIDOC Journal of Library & Information Technology during 2001-2012. In 2012 there is maximum number of (65) articles were published. During 2001-2012 publication of articles were increased every year. The study showed that 243(61%) articles published with the contribution of two or more than two authors. India is the dominant country other than foreign countries to contribute the source journal with 345 articles out of 391. Dr B M Gupta is published 26 article to the source journal which is highest than other authors. There are 64% contributions to have the length of 6-10 pages. It's clearly appeared Journal is the major reference sources to the authors.
5. Ramesh Pandita (2013) published an article entitled "Annals of Library and Information Studies (ALIS) Journal: A Bibliometric Study (2002-2012)". The source journal "Annals of Library and Information Studies" published quarterly in nature and each volume has four issues. The study period covered ten years and 49 to 59 volumes are taken for analysis. There are 310 articles were published during the study period. From the tabulation it's clearly known that average article per issue were steadily increased and 43.87% of the research output published with collaboration of two authors which is greater than single author, three authors and more than three authors. In this paper, through the bibliometric study, it is found that the Indian authors have contributed maximum number of articles to the journal Annals of Library and Information Studies. B.K. Sen has maximum contributed with 4% articles, followed by B.M. Gupta with 2 % articles and K.C.Garg, with 1.50 %. Reference distribution pattern reveals that on the whole 5307 references were cited in 310 articles making it on average 17.11 references per article. There are 73 (13.93%) articles are published the subject belongs to Aeronautics and Flight Mechanics followed by

Applied Physics and Fluid Dynamics 58 (11.06%). There are 13 (25%) were published from China followed by US were published 12(23.07%).

Objectives

The study made based on the following objectives. The main objectives of the study is

- To identify the year wise distribution of the journal "Scientometrics"
- To find out year wise authorship pattern of the source journal
- To list out the top ten prolific author wise distribution
- To identify the relative growth rate and doubling time
- To calculate the exponential growth rate
- To determine the country wise distribution
- To find out the institution wise distribution
- To categorized type of document wise distribution
- To list out keyword wise distribution

Scope and Limitations

The scope of the present study is to identify the results of the bibliometric analysis of the journal "Scientometrics" for the period from 2008 to 2017. The data collection was done by downloading the contents from the Web of Science database. The analysis covers mainly the number of articles, authorship pattern, geographical distribution of contributions, types and forms of documents, exponential growth rate etc. The study shows a trend of growth in the number of contributions every year. The limitation of the study is only concern the journal "Scientometrics" between the periods 2008-2017.

Results and Discussion

Table 1: Year Wise Distribution

Sl No.	Publication Year	Records	%
1	2008	131	4.7
2	2009	192	6.8
3	2010	233	8.3
4	2011	226	8.0
5	2012	267	9.5
6	2013	262	9.3

7	2014	362	12.9
8	2015	366	13.0
9	2016	379	13.5
10	2017	396	14.1
Total		**2814**	**100%**

Figure-1 Year Wise Distribution

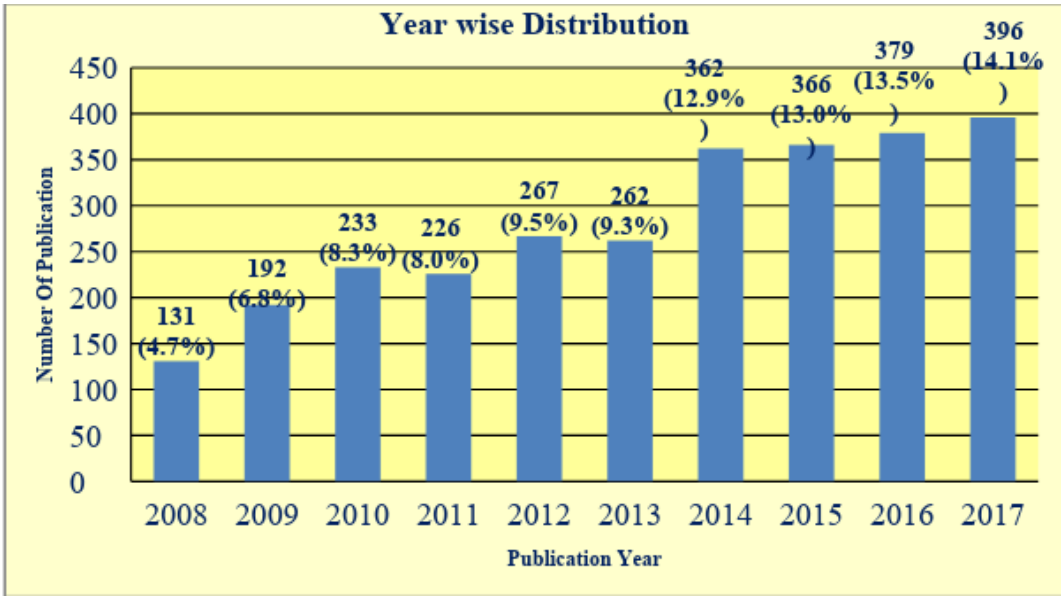

Table -1 show that the year wise distribution of the journal "Scientometrics". There are 2814 records were published during the study period. Out of 2814 records maximum number of 396(14.1%) records were published in 2007and lowest number of 131(4.7%) were published in 2007. Averages of 281 articles/research papers were published per year. Figure-1 shows the pictorial representation of the year wise distribution.

Table-2 Year wise authorship pattern of the journal "Scientometrics" during 2008-2017

Number of Authors	Year										Total No. of Papers	Percent
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
1	40	55	64	59	71	60	75	47	70	66	607	21.57
2	51	66	74	71	84	77	99	95	115	121	853	30.31
3	24	37	58	56	55	64	115	68	126	109	712	25.30

4	7	17	24	23	30	32	49	50	58	45	335	11.91
5	5	13	8	10	14	18	29	21	31	29	178	6.33
Above 5	4	4	5	7	13	11	22	19	18	26	129	4.58
Total	**131**	**192**	**233**	**226**	**267**	**262**	**389**	**300**	**418**	**396**	**2814**	**100%**

Figure-2 Year wise Authorship Pattern

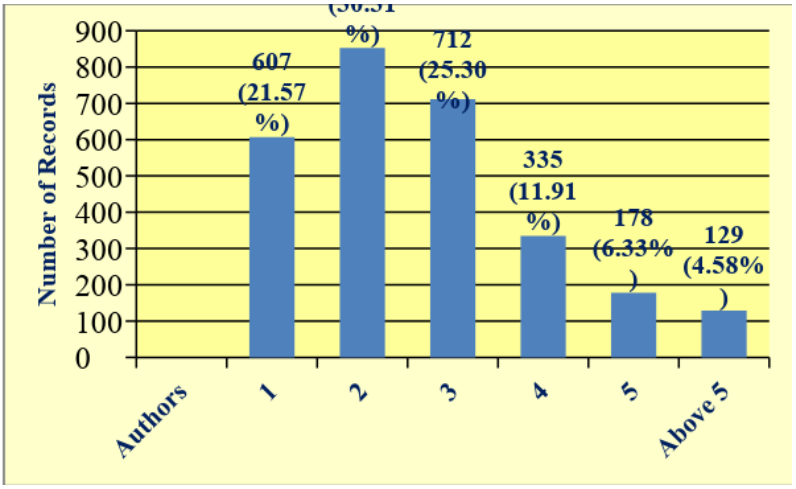

Table-2 shows that the year wise authorship pattern of the papers published in the journal "Scientometrics" during 2008-2017. Maximum number of 853(30.31%) papers were from two-authored followed by three authored papers were 712(25.30%), single author paper were 607(21.57%), four author paper were 335(11.91%), five authored paper were 178(6.33%) and finally more than five authored paper were 129(4.58%) published. table-4 clearly shows that most of the articles were published by two authored and least of the articles were published by more than five authored. Figure-2 shows the pictorial representation of the year wise authorship pattern.

Table-3 Prolific Author wise distribution of Articles

(Top Ten)

Sl. No	Authors	Records	%
1	Glanzel W	69	2.45
2	Bornmann L	50	1.77
3	Leydesdorff L	37	1.31
4	Abramo G	37	1.31

5	D'Angelo CA	36	1.27
6	Thelwall M	31	1.10
7	Rousseau R	31	1.10
8	Huang MH	28	0.99
9	Ho YS	28	0.99
10	Park HW	28	0.99

Table-3 shows top ten Prolific author's wise distribution of articles. There are 7025 authors produced 2814 articles, from these Glanzel W has published highest number of 69(2.45%) articles were published, followed by Bornmann L 50(1.77%), Leydesdorff L and Abramo G 37(1.31%), D'Angelo CA 36(1.27%), Thelwall M and Rousseau R 31(1.10%) and Huang MH, Ho YS and Park HW 28(0.99%) articles were published. From the table-3 shows that Glanzel W is the most productive author contributing with 69(2.45%) articles in the journal "Scientometrics".

Table-4 Single vs. Multi Author

Sl.No	Authorship Pattern	Publications	Percent
1	Single Author	607	21.57
2	Multiple Author	2207	78.43
Total		**2814**	**100%**

Figure-3 Single vs. Multi Authorship Pattern

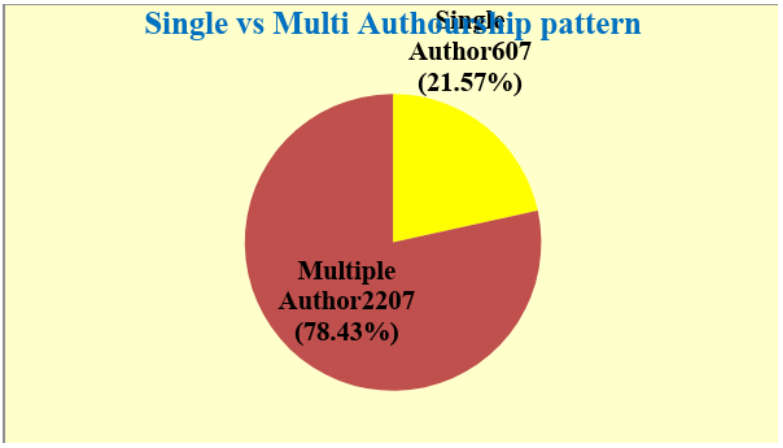

Table-4 shows that Single author vs. Multi author of the journal "Scientometrics". According to the above table most of the publications are in collaborative i.e. Out of 2814 publications there are

2207(78.43%) articles were published by multi authors and 607(21.57%) articles were published by single authors.

Table-5 Degree of Collaboration

ear	Single	Multiple	Nm+Ns	DC
2008	40	91	131	0.69
2009	55	137	192	0.71
2010	64	169	233	0.72
2011	59	167	226	0.74
2012	71	196	267	0.73
2013	60	202	262	0.77
2014	75	314	389	0.9
2015	47	253	300	0.84
2016	70	348	418	0.83
2017	66	330	396	0.83
Total	**607**	**2207**	**2814**	**Mean DC 0.78**

Degree of collaboration is determined to using the following formula suggested by K.Subramaniam (1983).

Dc = Nm / (Nm + Ns)

Where,

Dc = Degree of collaboration

Nm = Number of Multiple Authored papers

Ns = Number of Single Authored papers

The degree of collaboration rank form 0.69 to 0.9. The average degree of collaboration is 0.78 during 2008-2017 and it is clearly exposes that there exists a higher level of collaboration in the journal.

Table-6 Relative Growth Rate and Doubling Time of the Journal of "Scientometrics"

Year	No. of records	Cumulative records	W1	W2	R=W2-W1	Mean Relative Growth Rate	Doubling Time	Mean Doubling Time
2008	131	131	-	4.87	-			
2009	192	323	5.26	5.78	0.52		1.33	
2010	233	556	5.45	6.32	0.87	0.80	0.80	0.64
2011	226	782	5.42	6.66	1.24		0.56	
2012	267	1049	5.59	6.95	1.36		0.51	
2013	262	1311	5.57	7.18	1.61		0.43	
2014	362	1673	5.89	7.42	1.53		0.45	
2015	366	2039	5.90	7.62	1.72	1.73	0.40	0.4
2016	379	2418	5.94	7.79	1.85		0.37	
2017	396	2814	5.98	7.94	1.96		0.35	
Total	**2814**					**1.27**		**0.52**

The relative growth rate and doubling time has been calculated for the journal "Scientometrics" during the period 2008-2017. The first half of the years shows an average growth rate as 0.80 and the second half of the year is 1.73. The relative growth rate of the first half year is lower than the second half year. It's very clear that the growth rate of the second half is faster than the first half of the years.

The doubling time for the first half of the year is 0.64 and the second half of the year is 0.4, which means that the time towards the doubling of records is very lesser for the second half comparing to the first half of the years. It is therefore understood that the growth of the research publications increases year after year and the research growth is in increasing trend.

Table-7 Exponential Growth Rate

Sl.No	Year	No. of records	Exponential Growth Rate
1	2008	131	-
2	2009	192	1.47

3	2010	233	1.21
4	2011	226	0.97
5	2012	267	1.18
6	2013	262	0.98
7	2014	362	1.38
8	2015	366	1.01
9	2016	379	1.03
10	2017	396	1.04
Total		**2814**	**10.27**

Table -7 shows that the exponential growth rate of publication in the Journal "Scientometrics" during the period 2008-2017. The highest growth rate 1.04 was found during 2017 with 396 publications. It also found that the exponential growth rate was found to be 10.27.

Table-8 Document type

Document Types	Records	%
Article	2476	87.99
Article; Proceedings Paper	171	6.08
Editorial Material	55	1.95
Letter	35	1.24
Review	34	1.21
Correction	25	0.89
Biographical-Item	8	0.29
Book Review	6	0.21
Article; Retracted Publication	2	0.07
Retraction	2	0.07
Total	**2814**	**100%**

Figure-3 Document Type

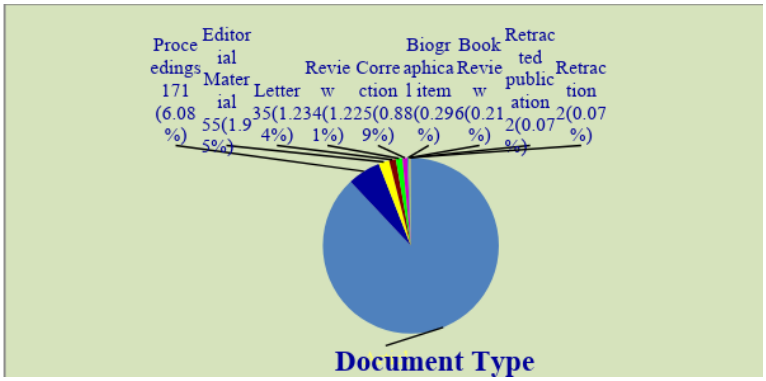

Table-8 represent that the source wise distribution of publication. It is real fact that most of the research result published in as articles. As the same in this journal most of the research results published as article in nature. Out of 2814 records there are 2476(87.99%) research results are articles. Followed by proceeding papers 171(6.08%), editorial materials 55(1.95%), letter 35(1.24%), review 34(1.21%), correction 25(0.89%), biographical item 8(0.29%), book review 6(0.21%) article; retracted Publication 2(0.07%) and retracted 2(0.07%) publication are remaining. Table-2 clearly represents that most of the researcher prepared to publish their research result in article.

Table-9 Country wise output (Top Fifteen)

Sl.No.	Countries	Records	%
1	Peoples R China	481	17.09
2	USA	388	13.78
3	Spain	296	10.51
4	England	193	6.85
5	Germany	191	6.78
6	Taiwan	173	6.14
7	Belgium	170	6.04
8	Netherlands	166	5.89
9	Italy	143	5.08
10	South Korea	121	4.30
11	Hungary	100	3.55
12	Brazil	94	3.34

13	India	91	3.23
14	Australia	87	3.09
15	Canada	80	2.84

Figure-4 Country wise distribution

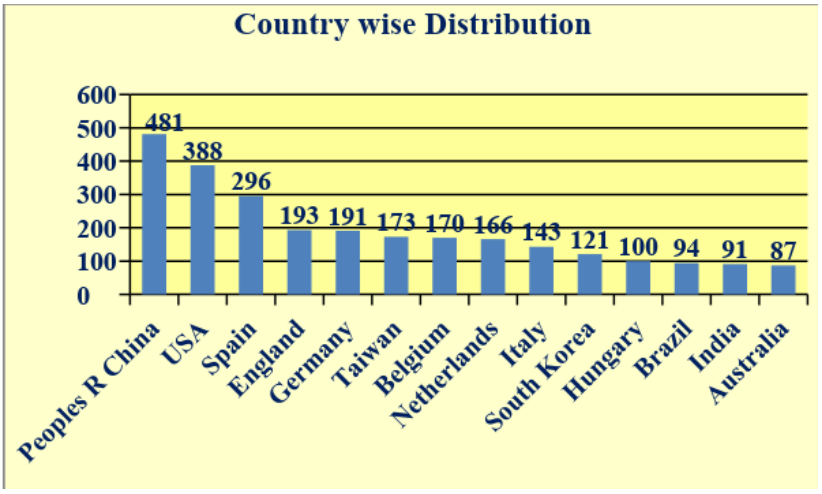

Table-9 shows that country wise distribution of the journal "Scientometrics" the top fifteen countries have been taken. It is observed that form the table-7 "China" has produced 481(17.09%) articles to the total contributions which is the highest, followed by "USA" by 388 (13.78%), "Spain" by 296(10.51%), "England" by 193(6.85%) "Germany" by 191(6.78%) "Taiwan" by 173(6.14%) "Belgium" by 170(6.04%) "Netherlands" by 166(5.89%) "Italy" 143(5.08%) "South Korea" by 121(4.30%) "Hungary" by 100(3.55%) "Brazil" by 94(3.34%) "India" by 91(3.23) "Australia" by 87 (3.09%) "Canada" by 80(2.84%).

Table-10 Institution wise Distribution

Sl No.	Institution	Records	%
1	Katholieke University Leuven	112	4.0
2	CSIC	66	2.3
3	Hungarian Academy of Science	65	2.3
4	Wuhan University.	59	2.1

5	University of Granada	58	2.1
6	Leiden University	55	2.0
7	Dalian University of Technology	52	1.8
8	National Taiwan University	46	1.6
9	Chinese Academy of Science	45	1.6
10	University of Amsterdam	39	1.4

Table -10 shows that institution wise contribution to the journal "Scientometrics". There are 112(4.0%) articles were published by Katholieke University Leuven which is highest contribution to the source journal. Followed CSIC 66(2.3%), Hungarian Academy of Science 65(2.3%), Wuhan University 59(2.1%), University of Granada 58 (2.15), Leiden University 55(2.0%), Dalian University of Technology 52(1.8%), National Taiwan University 46(1.6%), Chinese Academy of Science. 45(1.6%) and University of Amsterdam 39(1.4%) were published.

Table-11 Keywords wise Distribution

(Top Ten)

Sl.No	Keywords	Records	%
1	Science	731	25.97
2	Impact	400	14.21
3	Journals	251	8.91
4	Indicators	248	8.81
5	Performance	173	6.14
6	Innovation	166	5.89
7	Index	164	5.82
8	Networks	156	5.54
9	Patterns	148	5.25
10	Collaboration	137	4.86

Figure-5 Keyword wise Distribution

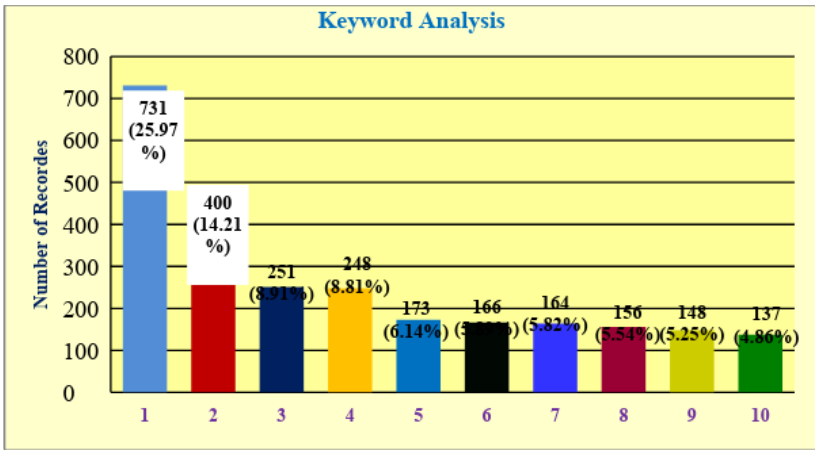

Table-11 shows that keyword wise distribution. In the Journal "Scientometrics", there are different kinds of keywords are used, out of these first place occupied by the key word "Science" with 731(25.97%) records. The word "Impact" occupied second place with 400(14.21%) records followed by "Journals" 251(8.91%), "Indicators" 248(8.81%), "Performance" 173(6.14%), "Innovation" 166(5.89%), "Index"164(5.89), "Networks" 156(5.54%), "Patterns" 148(5.25%) and "Collaboration" 137(4.86%).

Conclusion

The total number of papers published in the journal "Scientometrics" is 2814 in the study period 2008-2017. The highest number of 396(14.1%) articles published in the year 2017 and lowest number of 131(4.7%) articles were published in 2008. Maximum numbers of 853(30.31%) papers were from two-authored. Glanzel W was the most productive author with highest number of 69(2.45%) articles was published in the source journal. Out of 2814 publications there are 2207(78.43%) articles were published by multi authors and 607(21.57%) articles were published by single authors. The average degree of collaboration is 0.78 during 2008-2017 and it is clearly exposes that there exists a higher level of collaboration in the journal. The first half of the years shows an average growth rate as 0.80 and the second half of the year is 1.73. The growth rate of the second half is faster than the first half of the years. The growth of the research publications increases year after year and the research growth are in increasing trend. The highest growth rate 1.04 was found during 2017 with 396 publications. It also found that the exponential growth rate was found to be 10.27. Out

of 2814 records there are 2476(87.99%) research results are articles. "China" was the most productive country with produced 481(17.09%) articles to the total contributions which is the highest. There are 112(4.0%) articles were published by Katholieke Univ. Leuven which is highest contribution to the source journal. ", there are different kinds of keywords are used, out of these first place occupied by the key word "Science" with 731(25.97%) records.

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