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What Justifies whether Quality or Quantity of Publications? : Mapping on Publications of the Journal "Scientometrics" 2000-2017

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ABSTRACT

The present study evaluated publication output of the Journal "Scientometrics" for a period of 18 years between 2000 and 2017. The aim of study is to find out whether the quality is considered in terms of publication count or citation count. The publication and citation data have been downloaded from the Clarivate analytics -Web of Science database. Histcite and Bibexcel applications are used to present the dataset. The analysis focuses on the parameters of citation impact at local and global level, predominant authors and their h-index ranks, ranking of institution and countries. In addition, Scientographical mapping of density is presented using the VOS viewer software mapping techniques.

Keywords: *h-index; TLCS; TGCS; Mapping; Scientometrics; ACPP; Citations*

INTRODUCTION

Scientometrics is dealt with the quantitative features and distinctiveness of science and scientific research. The importance is placed on investigations in which the development and mechanism of science are studied by statistical mathematical methods.

Scientometrics is an International Journal for all Quantitative Aspects of the Science of Science, Communication in Science and Science Policy.

In this present study analyzed the publication output of an international journal "Scientometric" in which the research articles distributed in the field of Scientometrics. Its Impact Factor is 2.173 and publishing articles from 1979 reached 117 volumes with 359 issues. The field Scientometrics is "the study of the measurement of scientific and technological progress" (Garfield, 1979)[1] its origin is in the quantitative study of science policy research, or the science of science, which focuses on a wide variety of quantitative measurements, or indicators, of science at large.

In the present study the scientographic mapping technique was applied to all articles published in the Journal "Scientometrics" from the period 2000 to 2017.

REVIEW OF LITERATURE

V L and Sen B K (1995)[2] on the Journal of Oilseeds Research published during 1984 – 1992 which revealed that the keyword "Groundnut" tops the list with 53 records. Vijay and Raghavan, (2007)[3] analyzed the Journal of Food Science & Technology published during 2000 – 2004 and found that above 93% of contributions were by multiple authors. The scientometric study of Amsaveni and Sadik Batcha (2009)[4] corroborate with the citation analysis and they focused on the implication that they involve with the impact on recent researches. A Scientimetric Analysis on Indian Journal of Physics was made by Nattar (2009)[5] during 2004 – 2008 which revealed that the year 2004 records the highest percent of contributions regarding single, two and three authored.

A bibliometric study has been carried out by Kalyane Sanni S A and Zainab A N (2010)[6] examined the contributions published in Medical Journal of Malaysia during 2004 – 2008 and found 4.82% (28) of contributions were published by Malaysian authors with

foreign collaboration. Baskaran C and Sadik Batcha (2012)[7] studied that the Scietometrics study measures the performance based on several parameters, country annual growth rate and collaborative index. Sivasubramaniyan and Sadik Batcha (2012)[8] conducted a survey and found that the uses of e-resources are key factors in the publication output of individual authors and institutional growth by which productivity increases. Sadik Batcha (2013)[9] analysed in his study the scientometric approach in which revealed the result that it provides the researchers with various concepts, models, and techniques that may be applied to any discipline in order to explore its foundations, state, intellectual core, and potential future development. M. Muthukrishnan and R. Senthilkumar (2018)[10] analyzed research productivity in Annals of Surgical Oncology for a period of 13 years between 2005 and 2017. The resulted that there is a total of 35602 of authors for 13559 articles and it shows there are about 80 publications brought out by around 50 authors in this journal.

OBJECTIVES

The basic objective of the study is to testify the scientographic mapping on 3703 articles published by the international Journal "Scientometrics" during the period of 2000-2017 and the specific objectives are to identify and carry out the following factors.

- To examine the annual publications output of Scientometrics journal and citations received for them.
- To gauge publication density of top twenty five authors and to find their h-indices
- To analyse the contributory countries and their collaborative nature
- To find out the top institutions based on their number of research papers.

DATA SOURCE AND METHODOLOGY

The data for the present study were downloaded from the Clarivate analysis – Web of Science database in September 2018. A total of 3703 research publications was downloaded from 2000-2017. The downloaded records were enriched with different parameters like year, title, authors, country and institutions. Furthermore, the downloaded data were analyzed by using Histcite, Bibexcel and VOS Viewer software application.

DISCUSSION AND RESULT

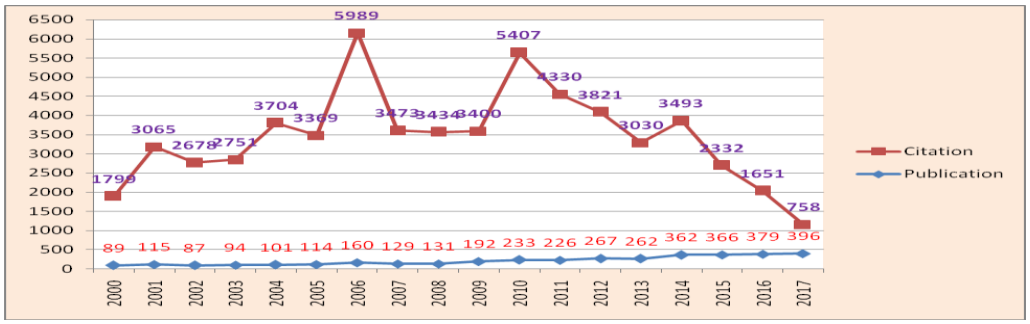
Analysis of Publications and Citations

The table 1 reveals that the number of research documents published from 2000-2017 are gradually increased. According to the publication output from the table 1 the year wise distribution of research documents, 2017 has the highest number of research documents 396 (10.7%) with 71 (0.58%) of local citation score and 758 (1.3%) of Total global citation score values. The Local Citation score is in peak in the year 2006 recording 1151 local citations 5986 global citations and it is observed prominent among the 18 years output and it stood in first rank in citation positions. This year publication output is just 160. In addition to that, the year 2010 has only 233 (6.33%) research documents whereas the local citation recorded was 1069 and global citation score proofed with 5407 and it is ranked second in the case of citation. It is followed by the year 2011 with minimum of 226 (9.9%) records and it stood in third rank position at the citation ranking with 1020 local citation score and 4330 total global citation score measured. It is realised that the increase in publications may not create impact on citation score yet the quality matters on TLCS and on TGCS. Graph 1 reflects the year wise publications and relates the citation score. It lights on the fact that the incresed publication rate is not bringing the increased citation rate.

Table1. *Year Wise Distribution of Publications and Citations*

Year	No of Publication	Publication %	Publication Rank	TLCS	TLCS %	TLCS Rank	TGCS	TGCS %	TGCS Rank
2000	89	2.4	17	487	4	15	1799	3.08	16
2001	115	3.1	13	613	5.04	14	3065	5.24	11
2002	87	2.3	18	631	5.19	12	2678	4.58	14
2003	94	2.5	16	669	5.5	9	2751	4.7	13
2004	101	2.7	15	625	5.14	13	3704	6.33	5
2005	114	3.1	14	645	5.3	11	3369	5.76	10
2006	160	4.3	10	1151	9.46	1	5989	10.24	1
2007	129	3.5	12	726	5.97	6	3473	5.94	7
2008	131	3.5	11	684	5.62	8	3434	5.87	8

2009	192	5.2	9	786	6.46	5	3400	5.81	9
2010	233	6.3	7	1069	8.79	2	5407	9.25	2
2011	226	6.1	8	1020	8.39	3	4330	7.4	3
2012	267	7.2	5	871	7.16	4	3821	6.53	4
2013	262	7.1	6	695	5.71	7	3030	5.18	12
2014	362	9.8	4	656	5.39	10	3493	5.97	6
2015	366	9.9	3	475	3.91	16	2332	3.99	15
2016	379	10.2	2	288	2.37	17	1651	2.82	17
2017	396	10.7	1	71	0.58	18	758	1.3	18
Total	**3703**	**100**		**12162**	**100**		**58484**	**100**	



Graph1. *Annual Distribution of Publications and Citation*

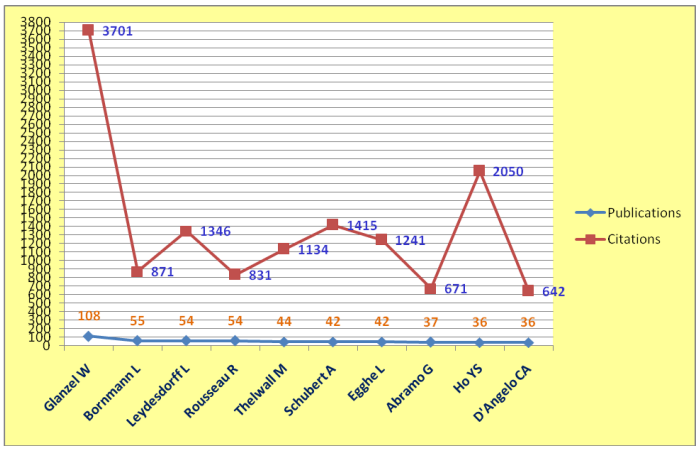
Analysis of Publications and Relative Citations of Productive Author

Table 2 displays the ranking of the authors and their relative h-index with ranking of articles. In the rank analysis the authors who have published more than 20 research articles are taken for analysis. This table lists the top 25 most productive authors during 2000-2017. Glanzel W published 108 research papers, 32 h-index, 3036 Citation sum within h-core, 3701 total citations and holds first rank in all the respect. It is revealed that about 650 citations are not taken account in h-core means that majority of his publications has received citations though less than h-core. Ho YS ranks second in the citation rank and third in h index ranking yet his rank falls nine in the publication count. Bornmann L has 55 publications, with 15 h-index. He falls 11th rank in h index and 12th in the case of citation. Leydesdorff L has recorded 2nd rank in h-index but his citation score is at 5th rank. Thelwal M ranks 4th in h index and 8th in citation ranking. The data set clearly pictures that no matter how many publications that an author brings out yet the quality publications alone shows impact in the forms of h-index, citations within h core and total citation count. The data set puts forth that the author Ho YS is the most productive author followed by Glanzel W with 3701 citations and van Raan AFJ with 1689 citations.

Table2. *Publication output of Top 25 Authors, h-index, Citation Score*

Name of Author	No of Publications	Publication Rank	h-index	h-index Rank	Citation Sum within h-core	h-core Citation Rank	Total Citation	Total citation Rank
Glanzel W	108	1	32	1	3036	1	3701	1
Bornmann L	55	2	15	11	645	18	871	12
Leydesdorff L	54	3	22	2	1094	7	1346	5
Rousseau R	54	4	14	15	600	20	831	14
Thelwall M	44	5	20	4	948	11	1134	8
Schubert A	42	6	19	5	1316	4	1415	4
Egghe L	42	7	12	18	1138	6	1241	7
Abramo G	37	8	14	13	533	24	671	18
Ho YS	36	9	20	3	1944	2	2050	2
D'Angelo CA	36	10	13	16	504	28	642	22
Thijs B	35	11	18	7	1001	9	1115	9
Guan JC	32	12	14	14	385	39	493	31
Huang MH	32	13	11	21	235	74	347	49
Park HW	29	14	13	17	350	44	451	35
Meyer M	27	15	19	6	1227	5	1314	6

Moed HF	24	16	15	12	1046	8	1079	10
Chen DZ	24	17	10	30	212	92	288	62
Prathap G	23	18	6	109	191	98	241	79
van Raan AFJ	22	19	16	9	1633	3	1689	3
Braun T	22	20	10	24	530	25	573	23
Gorraiz J	22	21	9	36	169	108	221	92
Debackere K	21	22	15	10	632	19	657	21
Van Leeuwen TN	20	23	16	8	982	10	1022	11
Porter AL	20	24	11	22	670	15	697	17
Lewison G	20	25	10	29	311	54	360	43



Graph2. *Distribution of Authors with Publications and Citations*

The graph 2 relates the publications and the citations of the top 25 authors. It clearly lights on the quality of individual author. This figure 1 shows that the collaboration of authors with one another shows Glanzel,W, Egghe,I, and Bordons are found in one cluster and Meyer,M and Debackere,K are in other.

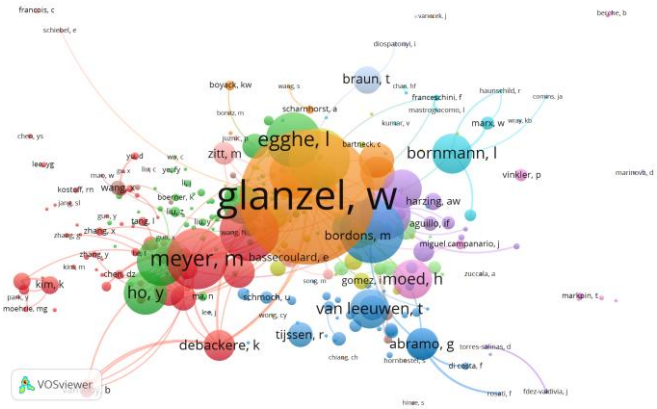


Fig1. *Collaboration of authors and their Clusters*

Analysis of the Publication Output of Top 25 Institutions

The individualities of 25 most productive institutions were analysed in this part, institutions which published more than 20 and above publications have considered as highly productive institutions. The publications outline of these institutions with their number of research articles, local citation score, the global citation score are presented in Table 3.

Table3. *Ranking of Institutions and their Research Performance*

Rank	Institution	Publications	Publications %	TLCS	TGCS	ACPP
1	Katholieke University Leuven	164	12.33%	1193	4399	26.82
2	Hungarian Academic Science	112	8.42%	1069	3518	31.41
3	Leiden University	89	6.69%	509	4494	50.49
4	CSIC	81	6.09%	274	1554	19.19
5	University Granada	77	5.79%	84	1090	14.16

6	Wuhan University	60	4.51%	151	544	9.07
7	University Amsterdam	59	4.44%	347	1561	26.46
8	Dalian University Technology	53	3.98%	153	560	10.57
9	Natl Taiwan University	50	3.76%	150	484	9.68
10	Chinese Academic Science	49	3.68%	121	450	9.18
11	Natl Institution Science Technology & Dev Studies	46	3.46%	186	651	14.15
12	University Antwerp	45	3.38%	296	1376	30.58
13	Wolverhampton University	42	3.16%	219	1149	27.36
14	Georgia Institution Technology	39	2.93%	174	757	19.41
15	Indiana University	38	2.86%	197	1053	27.71
16	University Roma Tor Vergata	38	2.86%	193	674	17.74
17	University Politecn Valencia	36	2.71%	30	342	9.50
18	Peking University	35	2.63%	152	794	22.69
19	University Sussex	34	2.56%	408	1703	50.09
20	Natl Res Council Italy	33	2.48%	145	533	16.15
21	Max Planck Gesell	31	2.33%	52	229	7.39
22	Nanjing University	31	2.33%	59	208	6.71
23	Drexel University	30	2.26%	56	315	10.50
24	University Malaya	29	2.18%	66	282	9.72
25	Unknown	29	2.18%	16	40	1.38

The institution 'Katholieke University Leuven' holds the first rank and it published 164 (12.33%) research papers with 1193 local and 4399 global citation scores, the average citation per paper is 26.82. The second rank holds by 'Hungarian Academic Science'. It recorded 112 (8.42%) research papers with 1069 local and 3518 global citation scores; the average citation per paper is 31.41. The third rank holds by 'Leiden University'. The total publications accounted is 89 (6.69%) research papers with 509 local and 4494 global citation scores, the average citation per paper is 50.49. The 'CSIC' holds the 4th rank 81 (6.09%) research papers with 274 local and 1554 global citation scores, the average citation per paper is 19.19. The 'University Granada' holds the 5th rank, the institution published 77 (5.79%) research papers with 84 local and 1090 global citation scores, and the average citation per paper is 14.16. These ranking is based on the number of publications whereas the qualitative publications brought out the revamping result. Leiden University (50.49), University Sussex (50.09), Hungarian Academic Science (31.41), University Antwerp (30.58) and Indiana University (27.71) are the institutions with high ACPP representing the quality product with citation impact hence they can be identified as the most productive institutions based on the Annual Citation per Paper received in terms of publications.

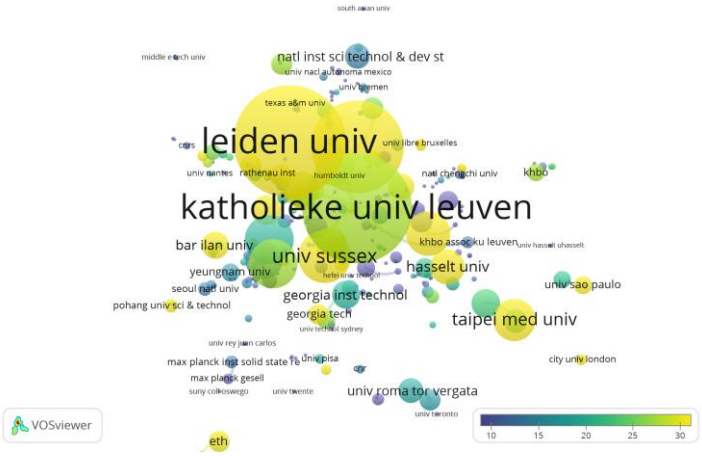


Fig2. *Collaboration of Institutions and their Clusters*

The figure 2 shows the clustering of universities in collaboration and their strength. The clusters are made by Kathlieke University Leuven, Leiden University and University of Sussex and in which fall other universities in collaboration showing their strength in clusters.

Analysis of the Publication Output of Top 25 Countries

Table 4 shows the publication output of the top twenty five countries by number of papers and China holds 1st rank among the top twenty five countries with its publication scores. China has 528 (12.65%) research papers as top in rank with moderate 5463 total global citation scores. The USA has secured second rank with 459 (11.00%) research papers with 1460 local citation scores, 7098 global citation score. Spain has 3rd rank of these countries, 356 (8.53%) research papers, 693 local citation score, 4734 total global citation score. The countries that rank between 4th and 20th position are UK, Netherlands, Belgium, Unknown, Germany, Taiwan, Hungary, Italy, South Korea, France, Australia, India, Brazil, Canada, Japan, Sweden, Iran, Austria, Denmar, Switzerland, Finland, South Africa. The Quality publication output by the countries is assessed in terms of citation. In this case Netherlands Stands to be top. It may be the reason that the Journal "Scientometrics" is published from Netherland. The USA records highest citations followed by UK, China, Belgium and Hungary. They are considered to be the most productive countries in terms of citation count.

Table4. *Distribution of the Publication Output of Top 25 Countries*

Rank	Country	Publications	Publications %	TLCS	TGCS
1	Peoples R China	528	12.65%	1419	5463
2	USA	459	11.00%	1460	7098
3	Spain	356	8.53%	693	4734
4	UK	274	6.57%	1243	5794
5	Netherlands	237	5.68%	1117	7661
6	Belgium	235	5.63%	1379	5197
7	Unknown	227	5.44%	992	4263
8	Germany	217	5.20%	662	3352
9	Taiwan	195	4.67%	648	3637
10	Hungary	153	3.67%	1353	4435
11	Italy	153	3.67%	415	1853
12	South Korea	131	3.14%	406	1567
13	France	115	2.76%	343	1529
14	Australia	114	2.73%	380	1836
15	India	114	2.73%	254	1021
16	Brazil	111	2.66%	291	1191
17	Canada	101	2.42%	364	1934
18	Japan	79	1.89%	159	575
19	Sweden	69	1.65%	261	1210
20	Iran	55	1.32%	168	734
21	Austria	52	1.25%	123	532
22	Denmark	52	1.25%	198	951
23	Switzerland	52	1.25%	187	889
24	Finland	48	1.15%	337	1339
25	South Africa	46	1.10%	187	715

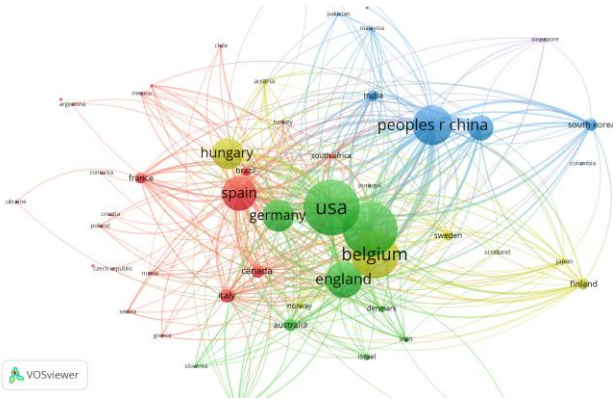


Fig5. *Showing Ranking of Country wise distributions*

Through the countries mapping analysis, we can find out many countries are inter relative in research publication output. There are 4 clusters identified in the present study. USA, Germany and England form as a cluster in publishing articles in the Journal Scientometrics. Spain, Italy and Canada form second inter relative cluster with appreciable strength. The country China, South Korea and India links in other cluster with strong link strength. Belgium, and Hungary are in the other cluster yet linked with USA cluster. The strength of the links are clearly shown in the figure above.

CONCLUSION

The Study reveals the findings that; even though the number of papers published in the Journal "Scientometrics" has gradually increased during 2000-2017, the citation received showed a

declining trend. The result gives an alarm that the quality of articles gets diminished in the recent period. The measures followed in the years between 2006 and 2010 may be followed to improve the citation score both in local and global level. The study has made upon 3703 research documents that have been published in Scientometrics during the period. It could be identified that the publication count of individual author may be high; on the other hand when the quality publication is measured in terms of indices, they fall behind shows quality matters in terms of citations rather than quantity of publications. It is proved by the h-index ranking secured by Glanzel (32), Ho YS (20) and Levdesdorff L (15). The same kind of result is identified in the case of institutional output while counting their publication and citations. It is supported by the output performance shown by Leiden University (50.49), University Sussex (50.09), and Hungarian Academic Science (31.41).

They are identified the most productive institutions based on the average number of citations per paper received. The finding is also strengthened by the result shown by the country wise analysis that USA records highest citations followed by UK, China, Belgium and Hungary. They are considered to be the most productive countries in terms of citation count yet in the ranking of publications they fall behind. The present study lights on the findings that the quality of Journal and its publications relies on the research output made by the quality authors and the relative citations they receive as impact. It is concluded that the Journal "Scientometrics" has brought out many quality articles and it is peak in quality from its establishment to 2010 yet the recent period puts forth the question mark whether the quality is diluted as the number of citations are decreasing.

ABBREVIATIONS USED

TLCS – Total Local Citation Score

TGCS - Total Global Citation Score

ACPP – Annual Citation per Paper

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