SCIENTOMETRIC ANALYSIS OF THE SCIENTOMETRICS JOURNAL: FROM 2000 TO 2019 USING THE SCOPUS DATABASE

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Abstract

The present study deals about the scientometric analysis of 4347 papers of Scientometrics Journal during the year 2000 to 2019. The study focuses on various aspects of Scientometrics journal such as its document type wise, published year-wise distribution of papers, contributors and their productivity, geographical distribution, citation pattern. The study shows that out of 4347 papers the highest number 3858 (88.75%) of articles in Items wise and the lowest number 1 (0.02%) of Retracted in Item wise were published in the study period. The highest number 397 (9.13%) of papers were published in 2018 and the lowest number 82 (1.89%) of research articles published in the year 2000. The maximum number of citations were 8828 (9.43%) in the year 2010 whereas, the minimum number of citations were 797 (0.85%) in the year 2019. The majority of 11.74% contributions from China which is the first position, followed by 10.57% were contributed by United States is the second rank. All the studies will be helpful for its further development.

Keywords: Scientometrics, Bibliometric study, Annual growth rate, Citation

1. Introduction

One of the most essential methods for evaluating scientific works is scientometrics. There are many definitions for the term 'Scientometrics' in the literature; Scientometrics is the quantitative study of the disciplines of science based on published literature and communication (Velmurugan & Radhakrishnan, 2015, p.187). Scientometrics is the study of measuring and analyzing science, technology, and innovation (Nayak, 2018). At present, the scientometrics study is one of the truly interdisciplinary research fields extended to almost all scientific fields (Singh, Nayak & Varma, 2017). Journals are responsible for refining and defining information and acting as scientific filters (Singh et al., 2021; Parida & Nayak, 2021). The importance of journals in academic life goes far beyond providing means of communication and permanent records (Singh et al., 2021; Nayak, Hari & Verma, 2021). after publication, other scholars reviewed and cited the findings (Parida, Singh & Nayak, 2022). For this Scientometric study, Scientometrics journal has been taken into account as a source journal. The study intends to explore the blueprints of scholarly communication of Scientometrics journal from 2000-2019 and determine to exposure the quality of contributions of this journal.

2. About the Journal

An international journal dedicated to the quantitative aspects of the science of science, as well as science communication and policy. Scientometrics is the study of the quantitative aspects and qualities

of science and scientific research. The focus is on studies that use statistical mathematical approaches to examine the growth and mechanism of science. Original research, brief communications, preliminary reports, review papers, letters to the editor, and book reviews on scientometrics are all published in this journal. The journal is essential for researchers and research administrators because of its multidisciplinary nature. Librarians and documentalists at major scientific agencies, ministries, research institutions, and laboratories benefit greatly from it. (https://www.springer.com/journal/11192).

3. Literature Review

A huge number of studies have been conducted on scientometrics. Some related literature has been considered for the study. Prieto-Gutierrez, J.J. & Segado-Boj, F. (2019) [1] evaluated the bibliometric analysis of research published in Annals of Library and Information Studies (ALIS), an India-based journal, for the period 2011– 2017. The results of the study showed that the journal's trends with those of other library and information science (LIS) journals from the same geographical area (India, and Asia as a whole) and with the 10 highest-rated LIS journals worldwide. Singh, Nayak, and Varma (2017) [2] examined the research output of 274 articles published in the Partnership: The Canadian journal of library and information practice and research 2010-2016. the analysis covers the areas like article distribution pattern, authorship pattern, types of bibliographic form used, and geographical distribution of authors, etc. M. Jabeen et al. (2016) [3] analyzed the research and highlights the research productivity and scholarly communication of library and information science professionals during 2003–2012 by using Web of Science databases from 40 library and information science core journals and visualize the library and information science growth and trends during the period 2003-2012. Singh (2012) [4] studied the 'Libri Journal' during the period from 2001 to 2009. Study analyses 221 papers published during this period. The study focuses on various aspects of the LIBRI journal such as its year-wise distribution of papers, authorship pattern, subject-wise distribution of papers, geographical distribution, citation pattern, and length of papers. It also shows that the maximum numbers of contributions are a single author with 124 papers (56.10%). It is also clear that Indian contributions in this journal are significantly less (1.87%). Dongare and Vaishali.S. (2015) [5] revel in the study of scientometric analysis of 151 articles, published in 5 volumes, during the year 2009-2013 in the Journal of Library Herald. The study shows that a single author contributed 95 (62.25%) articles. The study also reveals that most of the contributions are from India at 75.49 % and the average number of citations per article is 7.98%. Velmurugan C and Radhakrishnan N (2016) [6] The study investigate the scientific publication research productivity in the Malaysian Journal of Library and Information Science for a period of selected 7 years between 2008 and 2014. The findings of the study reveal that the highest number of author productivity of this research 74 (2.64%) were published in the year 2011. The study investigated the rank-wise distributions of contributions in which the majority of 31.84% of contributions were from Malaysia which is the first position. Kumar and Moorthy [7] have done 10- a year bibliometric study of the DESIDOC Journal of Library and Information Technology during 2001-2010, the study shows the authorship patterns, subject-wise distribution of articles, Institution-wise distribution of papers, and Major contributors to the journals.

4. Objectives of the Study

The major objectives of the present study covering the contents of "Scientometrics Journal" from 2000 to 2019 are: -

- To find out the Number of Items Published (All Types) wise distribution
- To find out the year-wise distribution of papers.
- To estimate the annual growth rate (AGR) of articles.
- To find out top contributors and their productivity for 2000–2019.

- To investigate the year-wise contributions of citation during the studied period.

- Highly cited authors and Documents.

- Geographical distribution

- Institution distribution of contributors

5. Methodology

The data presented in this paper have been accessed from Elsevier's Scopus database. The basic data relating to total publications during 2000-2019 has been collected for the study. All the retrieved data were rigorously investigated by applying Microsoft excel to provide the details.

5.1. Data Analysis and Finding of Results

Table 1 and Figure 1 examine the Item type-wise distribution of publications that were produced during the stipulated period. journal articles were found to be the most prominent form of communicating research results. Journal articles were the most numerous type of contribution with 3858 contributions (88.75%) followed by Letters with 176 contributions (4.05%), Reviews with 140 (3.22%), and Conference Paper with 87 (2.00%) and Retracted mere number only 1 (0.02%).

Table 1: Scientometrics (2000–2019): Numbers of Items Published (All Types)

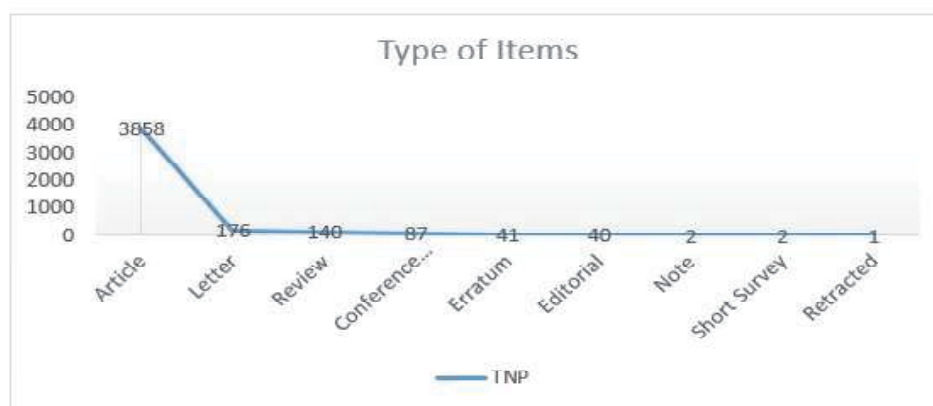| Type of items	TNP	Percentage
Article	3858	88.75
Letter	176	4.05
Review	140	3.22
Conference Paper	87	2.00
Erratum	41	0.94
Editorial	40	0.92
Note	2	0.05
Short Survey	2	0.05
Retracted	1	0.02
Total	**4347**	**100.00**

Figure-1: Scientometrics (2000–2019): Numbers of Items Published (All Types)

For this study, the total number of 4347 items published has been taken into consideration which shows from Table 2 and Figure 2 in which the growth of research papers published in 'Scientometrics' from 2000 to 2019. Out of 4347 publications, 397 (9.13%) were the highest numbers which were published in 2018, and the lowest number 82 (1.89%) of publications published in the year 2000. The range of articles published per year throughout the time of study was between 82 and 397.

Table-2: Year-wise Distribution of Papers

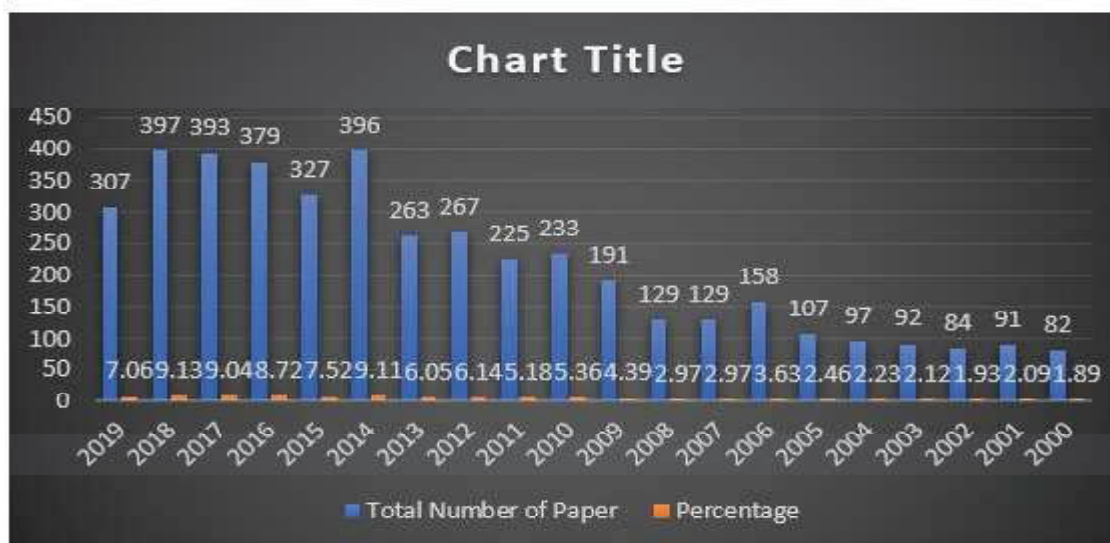| Year	TNP	Percentage	Year	TNP	Percentage
2000	82	1.89	2010	233	5.36
2001	91	2.09	2011	225	5.18
2002	84	1.93	2012	267	6.14
2003	92	2.12	2013	263	6.05
2004	97	2.23	2014	396	9.11
2005	107	2.46	2015	327	7.52
2006	158	3.63	2016	379	8.72
2007	129	2.97	2017	393	9.04
2008	129	2.97	2018	397	9.13
2009	191	4.39	2019	307	7.06
			Total	**4347**	**100.00**

TNP= Total Number of Papers

Figure-2: Year wise distribution of papers

5.2. Annual Growth Rate

The growth rate is a measurement that is essential in any field. In meaning the growth of the number of publications in a particular discipline, is often a measure of the annual increase or decrease. Here, the AGR has been determined as per the formula given below. In our study, the end value is 91 in the year 2001, the first value is 82 in the year 2000, and the AGR is in the year 2001 is 0.109756. Table 3 provides the AGR of the number of research articles for the period between 2000 and 2019. The

annual growth rate (AGR) is calculated based on the formula cited by Nayak et al. (2021) in their study and mentioned as follows:

$$AGR = \frac{(End\ value - First\ value)}{First\ value} ? 100$$

Table-3: AGR of Articles

Year	TNP	AGR	Year	TNP	AGR
2000	82	-	2010	233	0.219895
2001	91	0.109756	2011	225	-0.03433
2002	84	-0.07692	2012	267	0.186667
2003	92	0.095238	2013	263	-0.01498
2004	97	0.054348	2014	396	0.505703
2005	107	0.103093	2015	327	-0.17424
2006	158	0.476636	2016	379	0.159021
2007	129	-0.18354	2017	393	0.036939
2008	129	0	2018	397	0.010178
2009	191	0.48062	2019	307	-0.2267

AGR=Annual growth rate

Table 4 and Figure 3 show the Top 15 contributors and their productivity. Glänzel, W. is in the top rank with 113 nos of publications followed by Bornmann, L. with 76 nos of publications in the second rank, and Meyer, M. is in the 15th rank with 27 nos of publications.

Table-4: Top 15 Contributors and their Productivity for 2000–2019

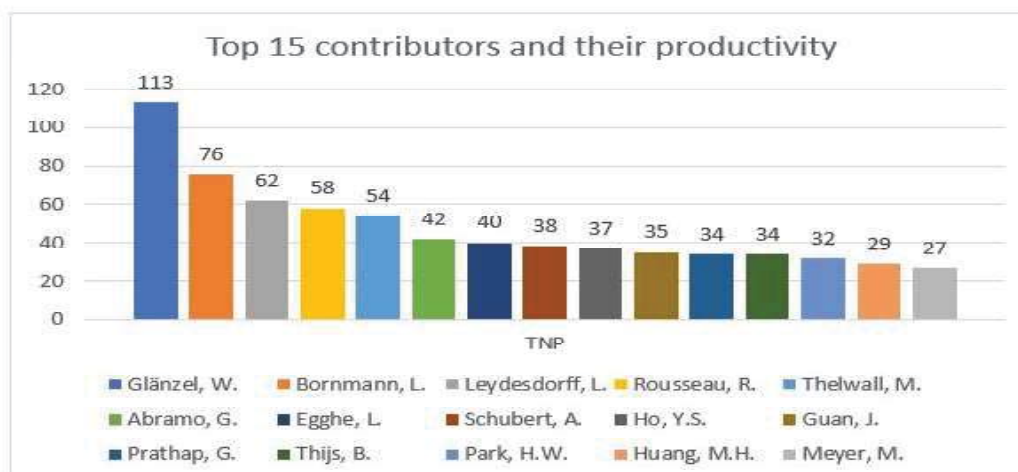| Rank	Author	TNP
1	Glänzel, W.	113
2	Bornmann, L.	76
3	Leydesdorff, L.	62
4	Rousseau, R.	58
5	Thelwall, M.	54
6	Abramo, G.	42
7	Egghe, L.	40
8	Schubert, A.	38
9	Ho, Y.S.	37
10	Guan, J.	35
11	Prathap, G.	34
12	Thijs, B.	34
13	Park, H.W.	32
14	Huang, M.H.	29
15	Meyer, M.	27

Figure-3: Top 15 contributors and their productivity for 2000–2019

As indicated in Table 5 the 4347 articles published in Scientometrics Journal received 93631 citations. Articles published in 2010 received the highest number of citations (8828 citations) followed by articles published in 2006 (7853 citations), in 2014 (6889 citations) whereas the lowest one was recorded in 2019 (797 citations). Overall, the average number of citations per article is 21.53.

Table-5: Year wise Citation

Year	Papers	No. of Citation	Percentage of Total	Average No of Citations/paper
2000	82	2104	2.25	25.65
2001	91	3871	4.13	42.53
2002	84	3383	3.61	40.27
2003	92	3522	3.76	38.28
2004	97	4907	5.24	50.58
2005	107	4287	4.58	40.06
2006	158	7853	8.39	49.70
2007	129	4662	4.98	36.13
2008	129	4543	4.85	35.21
2009	191	4793	5.12	25.09
2010	233	8828	9.43	37.88
2011	225	6455	6.89	28.68
2012	267	5820	6.22	21.79
2013	263	5062	5.41	19.24
2014	396	6889	7.36	17.39
2015	327	4690	5.01	14.34
2016	379	5117	5.47	13.50
2017	393	3788	4.05%	9.63
2018	397	2260	2.41%	5.69
2019	307	797	0.85%	2.59
Total	**4347**	**93631**	**100.00%**	**21.53**

As indicated in Table 6 Most 15 Cited Documents. Data represents the 15 most cited documents cited 351–1704 times. It defines the significance and authenticity of these research articles. It also displays that Software survey: VOSviewer, a computer program for bibliometric mapping by Van Eck, N.J. and Waltman, L. published in 2010 is a highly cited article with 1704 citations followed by article Citation review of Lagergren kinetic rate equation on adsorption reactions by Ho, Y.-S. published in 2004 with 1185 citations, article Theory and practice of the g-index by Egghe, L. published in the year 2006 with 1068 citations.

Table 6: Most 15 Cited Documents

Authors	Title	Year	Cited by
Van Eck, N.J., Waltman, L.	Software survey: VOSviewer, a computer program for bibliometric mapping	2010	1704
Ho, Y.-S.	Citation review of Lagergren kinetic rate equation on adsorption reactions	2004	1185
Egghe, L.	Theory and practice of the g-index	2006	1068
Boyack, K.W., Klavans, R., Börner, K.	Mapping the backbone of science	2005	492
Mongeon, P., Paul-Hus, A.	The journal coverage of Web of Science and Scopus: a comparative analysis	2016	487
Nederhof, A.J.	Bibliometric monitoring of research performance in the social sciences and the humanities: A review	2006	443
Larsen, P.O., von Ins, M.	The rate of growth in scientific publication and the decline in coverage provided by the science citation index	2010	439
Fanelli, D.	Negative results are disappearing from most disciplines and countries	2012	437
Van Raan, A.F.J.	Fatal attraction: Conceptual and methodological problems in the ranking of universities by bibliometric methods	2005	436
Glänzel, W.	National characteristics in international scientific co-authorship relations	2001	429
Van Raan, A.F.J.	Comparison of the Hirsch-index with standard bibliometric indicators and with peer judgment for 147 chemistry research groups	2006	412
Bar-Ilan, J.	Which h-index? - A comparison of WoS, Scopus, and Google Scholar	2008	384
Porter, A.L., Rafols, I.	Is science becoming more interdisciplinary? Measuring and mapping six research fields over time	2009	373
Braun, T., Glänzel, W., Schubert, A.	A Hirsch-type index for journals	2006	367
Glänzel, W., Moed, H.F.	Journal impact measures in bibliometric research	2002	351

6. Geographical distribution

It was feasible to analyze the articles under sample according to geographical distribution. The needed data were collected from the address field of the authors. Table 6 shows the geographical distribution of published articles in the journal. Out of **5731** articles, the highest number 673 (11.74%) has been contributed by China professionals which are followed by approximately 606 (10.57%) by United States authors, Spain is in the third rank with 435 (7.59%) articles. During the study period, the sample articles were produced by 86 countries. These countries have been categorized into five groups on their portion participant.

Table 6: Geographical Distribution

Countries grouping	Countries	No. of articles	Percentage	Rank
Group-1	China	673	11.74	1
	United States	606	10.57	2
	Spain	435	7.59	3
	United Kingdom	320	5.58	4
	Germany	290	5.06	5
	Belgium	288	5.03	6
	Netherlands	277	4.83	7
	Taiwan	215	3.75	8
Group-2	Italy	185	3.23	9
	India	182	3.18	10
	Hungary	166	2.90	11
	South Korea	157	2.74	12
	Brazil	142	2.48	13
	Australia	136	2.37	14
	France	128	2.23	15
	Canada	127	2.22	16
Group-3	Japan	98	1.71	17
	Sweden	89	1.55	18
	Switzerland	73	1.27	19
	Denmark	72	1.26	20
	Iran	69	1.20	21
	Austria	62	1.08	22
	Finland	61	1.06	23
Group-4	Other Countries*	1-58	8.52	24
Group-5	Undefined	8	0.14	25
	Total	**86**	**5731**	**100.00 -**

* (Uruguay, Qatar, Palestine, North Korea, Mozambique, Macao, Latvia, Kenya, Kazakhstan, Jordan, Iceland, Guatemala, Azerbaijan, Armenia, Indonesia, Ecuador, Bosnia and Herzegovina, Viet

Nam, Tunisia, Puerto Rico, Nigeria, Lithuania, Kuwait, Cyprus, Bulgaria, Benin, Bangladesh, United Arab Emirates, Philippines, Luxembourg, Estonia, Venezuela, Ukraine, Slovakia, Morocco, Egypt, New Zealand, Argentina, Ireland, Romania, Thailand, Hong Kong, Colombia, Croatia, Saudi Arabia, Czech Republic, Serbia, Greece, Chile, Singapore, Cuba, Slovenia, Portugal, Norway, Malaysia, Israel, Poland, Pakistan, Mexico, Turkey, Russian Federation, South Africa)

A total of 15 institutions contributing 25 or more articles in the period 2000–20019 were included in the list of major institutions (Table 7). The National Natural Science Foundation of China is in the top rank with 293 (35.30%) documents followed by National Science Foundation with 110 (13.25%) documents. European Commission in the third rank with 69 (8.31%) documents.

Table 7: List of Major Institutions

Institutions	Documents	Percentage	Rank
National Natural Science Foundation of China	293	35.30	1
National Science Foundation	110	13.25	2
European Commission	69	8.31	3
National Research Foundation of Korea	43	5.18	4
Conselho Nacional de Desenvolvimento CientÃfico e TecnolÃ³gico	37	4.46	5
National Science Council	32	3.86	6
European Regional Development Fund	30	3.61	7
Deutsche Forschungsgemeinschaft	29	3.49	8
Fundamental Research Funds for the Central Universities	29	3.49	8
National Institutes of Health	29	3.49	8
Australian Research Council	27	3.25	9
CoordenaÃ§Ã£o de AperfeiÃ§oamento de Pessoal de NÃvel Superior	26	3.13	10
Japan Society for the Promotion of Science	26	3.13	10
Ministerio de Ciencia e InnovaciÃ³n	25	3.01	11
National Council for Scientific Research	25	3.01	11

7. Findings

Following are the findings of the study.

- The highest number 3858 (88.75%) of articles in Item wise and the lowest number 1 (0.02%) of Retracted in Item wise were published in the study period.
- The highest number of 397 (9.13%) papers were published in 2018 and the lowest number 82 (1.89%) research articles published in the year 2000.
- The authors investigated the AGR in which the negative change of "0.07692% in 2002 and an increase of 0.48062% in the year 2009. The average AGR was 0.0909149474% during the period.
- Author "Glänzel, W." has the highest number of contributions with 113 nos. for the study period 2000–2019.

- The maximum number of citations was 8828 (9.43%) in the year 2010 whereas, the minimum number of citations was 797 (0.85%) in the year 2019.

- The majority of 11.74% of contributions from China which is the first position, followed by 10.57% contributed by the United States in the second rank, 7.59% of contributions came from Spain in the third position, and 5.58% of contributions came from the United Kingdom, etc.

8. Conclusion

Scientometrics journal is an International Journal for all Quantitative Aspects of the Science of Science, Communication in Science, and Science Policy. Scientometrics journal has published 4347 papers during the period of study (2000-2019). It may be concluded that the maximum number of contributed Items are articles with 3858 nos. (88.75%). The study also shows that the highest number of papers was published in the year 2018 with 397 papers (9.13%). From the data collected for the present study, it may be seen that the Chinese contribution is significantly high in 673 papers (11.74%).

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