7-2-2021

A Scientometric Study of Highly Cited Journals in Science Discipline Indexed by Scopus and Web of Science

Geeta Gadhvi
gggadhvi@gujaratuniversity.ac.in

Kinjal K. Parekh Ms.
DLISc, Gujarat University, kinjalparekh1112@gmail.com

A Scientometric Study of Highly Cited Journals in Science Discipline Indexed by Scopus and Web of Science

By

Kinjal Parekh
M.Phil. Research Scholar
Dept. of Library and Information Science
Gujarat University, Ahmedabad
kinjalparekh1112@gmail.com

Dr. Geeta Girish Gadhvi
Associate Professor & Head
Dept. of Library and Information Science
Gujarat University, Ahmedabad
gggadhvi@gujaratuniversity.ac.in

ABSTRACT:

The main objective of this is to explicitly characterize a quantitative analysis by utilizing scientometric study for highly cited journals in scientific discipline indexed by Scopus and WOS. The Paper published during the years 2012-2016 are considered for research analysis with distinct objectives and correlated conclusions. The main purpose of this paper is to analyse the data in a variety of methods such as document types, country, institutions/organisation etc. This study will be beneficial for the research scholars to understand the various areas of research work conducted during 2012-16.

Keywords: Scientometric, Bibliometric, PLOSOne, Scopus, WebofScience

Introduction:

In the present era, there are academic and research institutes concentrating on the research output of their institutions. During the last few years, Scientometric has been increasingly used and is still being used to evaluate the research performance of the scientists and the growth path of various disciplines of science. Bibliometric and Scientometric research include studies related to the diffusion and development of literature, author productivity, obsolescence of documents, distribution of scientific literature by country, by language, which helps to monitor the growth and pattern of research. (Rajendran & et. Al., 2011)

There are multifarious aspects of Scientometric studies that have been performed on journal citation in various subject areas both in India and abroad. The present research focuses on the highly cited journal in the Science discipline indexed by Scopus and Web of Science (WOS). The total number of journals indexed in Scopus is **40,400 and 39,900** in WOS of all subjects. There are several reasons why researchers intend to operate a descriptive Scientometric study of a particular academic area (Straub, 2006). Among them, the most critical issue is an attempt to comprehend the identity of a scientific discipline. In fact, despite a continuous growth of the body of knowledge, it is practical to pause from time to time and engage in a retrospective analysis of the discipline itself to respond essential questions (Holsapple, 2008).

Extremely well cited articles can provide information in various and more useful fields including Authors, institutions, countries, etc. The Indian Scientist has increased substantially in the recently past years. To recognise the contribution and trend of Indian scientists in the foreign journal. a Scientometric study has been conducted on one of the most trustworthy journals of the United States, which is the world's first multidisciplinary open-access journal that accepts scientifically rigorous research, irrespective of novelty

In this study, an effort has been made to analyse the number of documents published during the year 2012 – 2016 of highly cited science journals, to explore the author pattern, collaborative research, country-wise publication, etc., this study also encompasses the total number of articles indexed in Scopus and WOS of highly cited science journals. There is always a possibility to indicate the variations while gathering data using the same search strategy for the same journal from Scopus and WOS and the leading cause to get variation in data is indexing techniques, criteria, etc. towards both databases.

Scope and Limitation:

This study is limited to Scientometric analysis of highly cited journals in the science discipline indexed in Scopus and WOS published during 2012- 2016.

Objectives:

1.   To identify highly cited science journals from the years 2012 to 2016; indexed by Scopus and WOS Database.

2.   To analyse publications in different types of documents for highly cited journal indexed by Scopus and WOS Database.

3.   To identify most productive institutions and organization, who have contributed research articles and the same are indexed by Scopus and WOS Databases

4.   Efforts are made to find out the country-wise publications for highly cited journals indexed by Scopus and WOS Database.

5.   To quantify the year-wise growth of publications in science journals, which are highly cited during the stipulated period of time indexed by Scopus and WOS.

Methodology:

For the purpose of conducting the study, Scopus and Web of Science bibliographic databases have been extensively used to distinguish the highly cited journals in the science discipline for the period of 2012 – 2016, Extracted bibliographic records for analysis and methods of Data Analysis, Interpretation based on data collection from Scopus and Web of science databases, Microsoft MS Excel was used to analyse each subject category. analysed data which have been presented in the form of statistical text, graphical charts, tables, and figures.

In the first step, the data was extracted from Scopus in comma-separated values and from WOS in plain text format. The time range for these groups of data was considered from 2012 to 2016. In the second step, the data were enumerated into an Excel spreadsheet and formulated for analysis, and in the third step, all retrieved records and papers citations were analysed through analytical method and tools based on distinct criteria. The results of these analyses are presented in the following.

The researcher explains the steps which are used for this analysis as below.

● Selection of Subject

● Choose the source for primary data collection

● Analyse an exported data

- Interpretation and data visualization

- Identify the results

Review of Literature:

Bibliometric, Scientometric, and Citation studies have been conducted earlier by diverse authors on the various individual journal publications and literature on specific subject areas.

Bibliometric:

Though the term 'Bibliometric' was first coined by Pritchard in 1969, the origins of bibliometric research can be traced back to the beginning of the 19th century within areas, such as, law. Shapiro (1999) indicates that several aspects of bibliometric were "practiced in the legal field long before being introduced into scientific literature". Early research in the 1880s was reported and depicts documentation in France, but initial studies on qualitative and quantitative analysis of science seem to originate within psychological fields (Godin, 2006).

Scientometrics:

Scientometrics is the science of method scientific output which is like Bibliometrics used by librarians and information scientists. (Aruna, 1982) states that related fields are the history of science and technology philosophy of science and sociology of scientific knowledge. (Garfield, 1995); Scientometric is an application of mathematical and statistical methods of scientific literature (Solla, 2000) to identify national and international network and to map the development of new fields of science and technology as well as to know the inner logic of scientific development (Yadav Jaisi, 1984).

Scopus and Web of Science Database:

During his long and impactful career, Eugene Garfield made significant contributions to the field of information science and Scientometrics. His work has resulted in numerous

accolades including being considered as "one of the most visionary figures in information science and Scientometrics" (Van Raan and Wouters 2017)

Most of the studies that are available focus on qualitative aspects. As for quantitative data, the producers of WOS and Scopus provide information on the price, database size and number of journals covered. Scopus covers the largest number of serial publications. At the management and policy levels, bibliometric analysis has been identified as one of the tools that have a potential to assist decision-makers in understanding science and Innovation, investing in science and innovation and using the "Science of Science" policy to address national priorities (Rosas et al., 2011).

ISI Web of Science (WOS) has built a reputation as the ancient citation resource, containing the most prestigious academic journals used for citation analysis (Norris and Oppenheim, 2007). Dess (2006) identifies WOS as the trailblazer for citation resources and more than 40 years, WOS had no competitors (Meho and Yang, 2006, p. 3). In 2004, this improved when Elsevier launched Scopus as a multi-disciplinary citation resource (Norris and Oppenheim, 2007). According to (Dess, 2006), Scopus as an interdisciplinary citation resource is marketed for the Science, Technology, and Medicine market. According to Manafy (2005), the challenge for Scopus was to position itself as a citation resource in a market where WOS held the monopoly.

Data Analysis and Interpretation

Analysis and interpretation of data is the process of assigning a meaning to the collection of information and determining the conclusions, significance and implications of the results. This is an important and exciting step in the research process. In all the research, analysis follows data collection.

1. **Contribution of Research by the Document type in PLOS One: Scopus**

   Table No. 1 show the year wise number of publications with document types in PLOS One journal indexed by Scopus.

Table 1 Contribution of Research by Document Types: SCOPUS

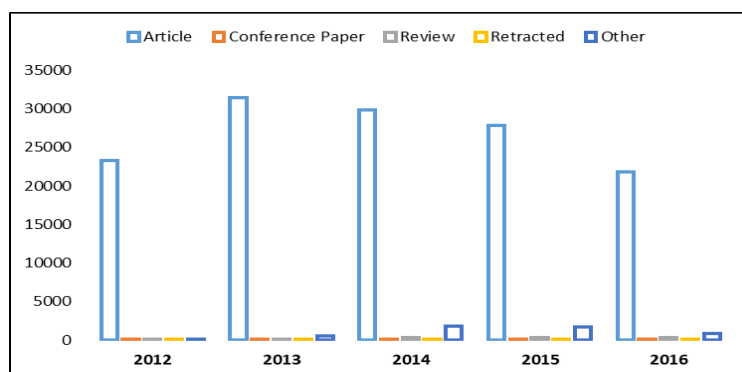| Document Types	No. of Publications					Total	Percentage %
	2012	**2013**	**2014**	**2015**	**2016**		
Article	23275	31371	29812	27833	21762	134053	96.101
Conference Paper	1	1	2	6	13	23	2.9034
Review	174	146	321	314	297	1252	0.9259
Retracted	6	13	19	7	4	49	0.0445
Other	14	522	1838	1665	909	4948	0.0025
Total	**23470**	**32053**	**31992**	**29825**	**22985**	**140325**	**100**

Figure 1 Contribution of research by document types

The Table 1 and Figure 1 explain that there are different types of documents that have been published in the journal PLOS One during the last period of 5 years (2012 – 2016). On the Observation of Table 1, it has visibly been shown that the maximum 1,34,053 (96.101%) of publication were article documents type, followed by review with 1252(0.9259%) of contributions. The overall data of contribution of research by document types is shown in above table.

Year-wise the number of the documents published in PLOS One journal is mentioned in Table 1 and Figure 1. It is shown that in the year 2013 highest number of documents i.e., 32,053 published; followed by the year 2014 (31,992), 2015(29,825), 2012(23,470) and in 2016 (22,985). It means the lowest documents published in the year 2016.

2. Contribution of Research by the Document type in PLOS One: WOS

Table No. 2 narrates the year-wise number of publications with documents types in PLOS One journal indexed by Web of Science.

Table 2 Contribution of Research by Document Types: WOS

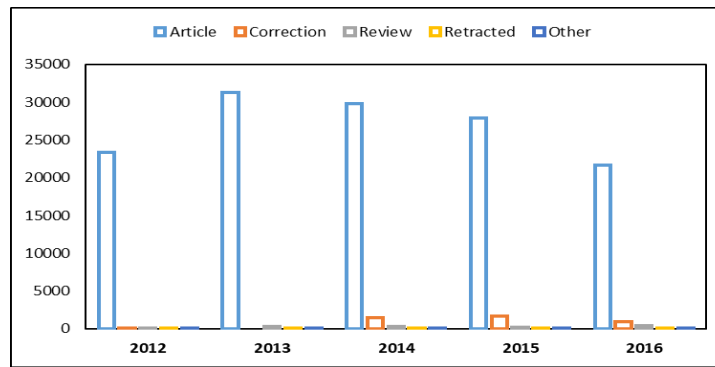| Document Types	No. of Publications					Total	Percentage %
	2012	2013	2014	2015	2016		
Article	23319	31234	29781	27871	21678	133883	96.1009
Correction	4	0	1427	1682	932	4045	2.9034
Review	128	267	262	245	388	1290	0.9259
Retracted	9	18	10	7	18	62	0.0445
Other	5	3	12	9	6	35	0.0025
Total	23465	31522	31492	29814	23022	139315	100.00

Figure 2 Contribution of Research by Document Types

Table 2 and Figure 2 describe the different types of documents published in the Journal PLOS One during the period of 5 years i.e. (2012 – 2016). On the observation of table 2, it has been clearly shown that the maximum 1, 33, 883 (i.e.96.1009%) of publications were article type documents followed by correction with 4,045 (2.9034%) of contributions. The overall data of contribution of research by documents types is shown in table 2. It is also shown that in the year 2013 highest number of a documents published is 31,522; followed by the year 2014 (31,492), 2015 (29,814), 2012(23,465) and in 2016 (23,022), means the year 2016 reported the lowest documents publication.

3. Year-wise Growth of Research Publication in Scopus & WOS

As shown in table No. 3 the comparative year-wise number of publications with percentage in PLOS One journal indexed by Scopus and WOS.

Table 3 Year wise growth of research publication: Scopus & WOS	Figure 3 Year-wise growth of research publications: Scopus & WOS

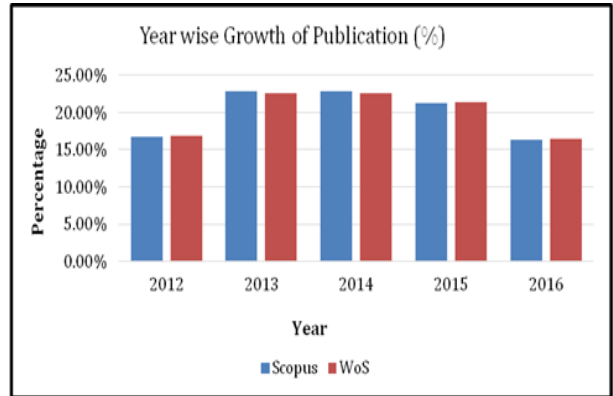| Growth of Publication				
Year	Scopus		WOS	
	No.	%	No	%
2012	23470	16.73%	23465	16.84%
2013	32053	22.84%	31522	22.63%
2014	31992	22.80%	31492	22.60%
2015	29825	2.25%	29814	2.40%
2016	22985	16.38%	23022	16.53%

Year wise Growth of Publication (%)

Table 3 and Figure 3 shows the year-wise growth of publication of PLOS One journal indexed in Scopus and WOS individually. There are a vast number of publications published and indexed in year 2013 that is 22.84% (Scopus) & 22.63% (WOS) followed by year 2014 which is 22.80% (Scopus) & 22.60% (WOS) among total number of publications during 2012 - 2016.

4. Highly Productive Countries in PLOS One Journal: SCOPUS

Table No. 4 shows the country-wise number of publication and productivity shares in PLOS One journal indexed by Scopus during stipulated period.

Table 4

Highly Productive Countries & Overall Contribution in terms of %: SCOPUS

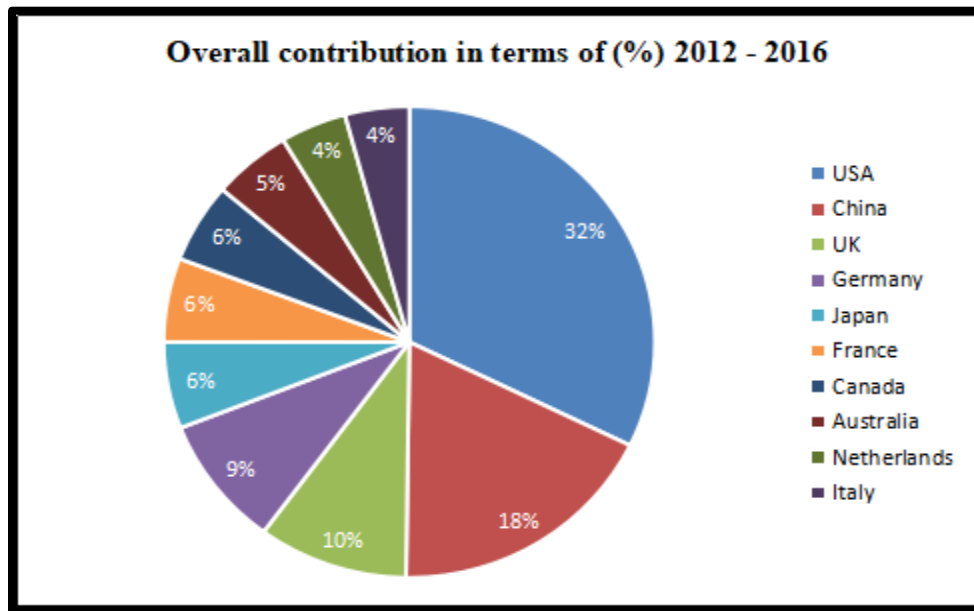| Sr. No	Country	Number of Publication (during 2012 - 2016)	Overall contribution in terms of percentage
1	USA	43999	32.23
2	China	24562	17.99
3	UK	13508	9.89
4	Germany	12240	8.96
5	Japan	8097	5.93
6	France	7859	5.76
7	Canada	7456	5.46
8	Australia	7094	5.20
9	Netherlands	5952	4.36
10	Italy	5769	4.23

Figure 4 Overall Contribution in terms of percentage: SCOPUS

The Table 4 reveals through investigating, country-wise productivity of PLOS One journal from Scopus, and many individual countries were identified. The Figure 4 defines the landscape of top 10 country contributors in the respective year from 2012-2016. The top five countries were USA, China, UK, Germany and Japan. The contributions of the top 10 countries varied during 2012 -16. The USA produced the highest that is 32.23% of

documents during 2012 -16. There has been extraordinarily little contribution which was identified by Italy (4.23%) followed by Netherland (4.32%), Australia (5.20 %) and Canada (5.46 %).

5. Highly productive counties contributed in PLOS One journal: WOS

Table No. 5 shows the country wise explanation of number of publication and productivity shares in PLOS One journal indexed by WOS during 2012 to 2016.

Table 5 - Most Productive Countries & Overall Contribution: WOS

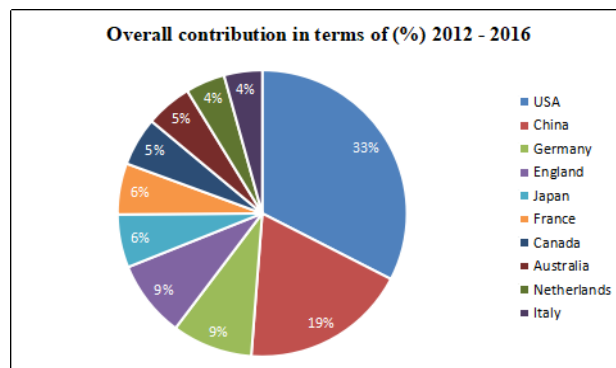| Sr. No	Country	Number of Publication (during 2012 - 2016)	Overall contribution in terms of %
1	USA	43505	32.58
2	China	24890	18.64
3	Germany	12037	9.01
4	England	11558	8.66
5	Japan	8007	6.00
6	France	7712	5.78
7	Canada	7314	5.48
8	Australia	6943	5.20
9	Netherlands	5884	4.41
10	Italy	5688	4.26

Figure 5 Overall Contribution in terms of Percentage: WOS

Through the analysis it was observed that the country-wise productivity of PLOS One journal from WOS and several individual countries were identified. Figure 5 describes the list of top

10 country contributors in the respective year from 2012-2016. The top five countries were the USA, China, Germany, England, and Japan. The contributions of the top 10 countries varied during 2012 -16 and the USA produced the highest number i. e. 32.58% of documents during 2012-16. There was minimal contribution identified by Italy (4.26%) followed by Netherland (4.41%), Australia (5.20%) and Canada (5.48%). While investigating the country-wise productivity of PLOS One Journal from WOS, numerous individual countries were identified. Table 5 presents the list of top 10 country contributors in the respective year from 2012-2016. The top five countries were USA, China, Germany, England, Japan, and France. The contributions of the top 10 countries varied in an individual year. From total contribution, till 2012 – 2016 USA's the greatest number of contributions in the year 2013. The USA was the Top Contributor among the top 10 countries. There was significantly low contribution identified by Italy in 2016 (887) among the Top 10 countries. There are varying number of publications retrieved in an individual year.

6. Highly Contributing Institution/organization in PLOS One Journal: SCOPUS

The Table No. 6 defines the Top Institutions/Organizations with year-wise number of publications in PLOS One journal indexed by Scopus.

Table 6 - Highly Contributing Institutions/Organizations: SCOPUS

| Institutes/Organizations	No. of Publication				
	2012	2013	2014	2015	2016
Chinese Academy of Sciences	561	761	653	512	331
CNRS	553	674	490	451	332
INSERM	553	620	460	428	377
Ministry of Education China	367	556	390	412	283
Harvard Medical School	431	468	370	341	243
NIH	356	427	297	226	171
University of Oxford	260	327	276	264	218
UCL	227	319	272	274	240
Karolinska Institute	248	297	286	261	203
University of Toronto	235	305	258	228	199
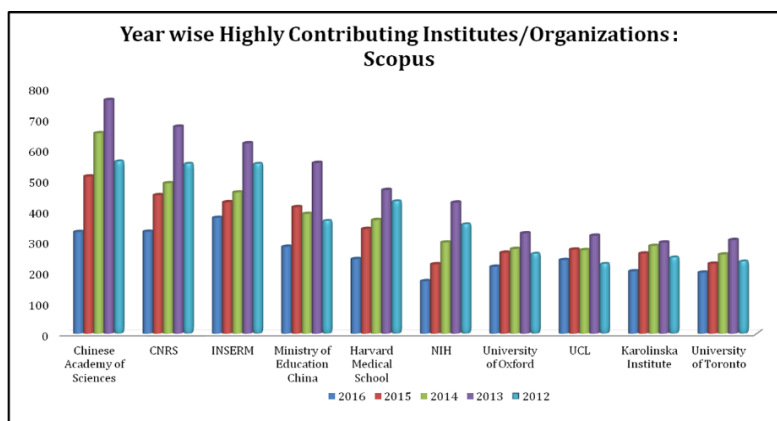
Figure 6 - Highly Contributed Institutions/Organizations: SCOPUS

While analysing all the documents, researchers discovered that there are several distinct institutions that have contributed in this journal. Among them the "Chinese Academy of Sciences" contributed the highest number of publications in the year 2012-16 followed by CNRS, INSERM, etc. In the particular year 2016 the highest number of publications identified during analysis is "INSERM".

7. Highly Contributing Institution/organization in PLOS One Journal: WOS

The Table No. 7 illustrates the Top Contributor Institutions/Organizations with year-wise number of publications in PLOS One journal indexed by WOS.

Table 7 - Highly Contributed Institutions/Organizations: WOS

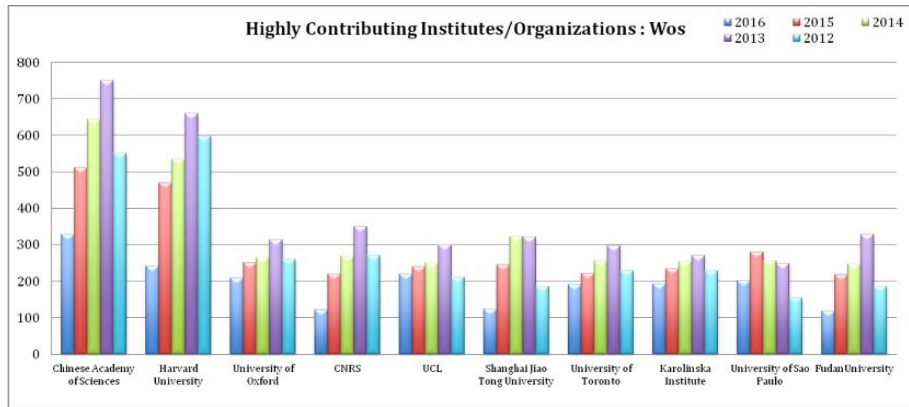| Institute/Organization	Year				
	2012	2013	2014	2015	2016
Chinese Academy of Sciences	551	750	643	511	329
Harvard University	597	659	534	469	241
University of Oxford	259	314	264	251	209
CNRS	271	350	268	220	122
UCL	210	299	251	239	219
Shanghai Jiao Tong University	185	320	322	244	124
University of Toronto	228	297	256	221	191
Karolinska Institute	229	271	253	234	193
University of Sao Paulo	154	248	255	280	202
Fudan University	185	328	247	217	118

Figure 7 - Highly Contributing Institute/organization in PLOS One journal: WOS

While analysing all the documents, researchers noticed that there are countless institutions who have contributed in this journal which were indexed by WOS. Amongst all; the "Chinese Academy of Sciences" contributed the greatest number of publications in the year 2012 -16 followed by Harvard University, University of Oxford, CNRS. In the particular year 2016 the highest number of publications identified during analysis are found from the "Chinese Academy of Sciences".

At the end of analysis, it is clearly showing that there are great number of Article type documents has been published in PLOS One journal as indexed by Scopus and WOS. While analyse the year wise growth of publication, there are highest number of publications identified in the year 2013 in both the databases. USA is at the top for maximum number of publications in both databases during 2012 - 2016. As well as Chinese Academy of Science is the institute who published the greatest number of documents during 2012 - 2016.

Key Findings:

Among the set objectives, the first objective is to identify highly cited science journal indexed in Scopus and WOS during 2012 - 2016, researchers accessed both the databases individually and found out "PLOS One " journal is the highly cited journal in the science discipline during 2012 - 2016 with 1,40,325 publications from Scopus and 1,39,315 from WOS are found.

To fulfil the second objective is to analyse publications in different types of documents for highly cited journal indexed by SCOPUS and WOS, the researcher found variations in the number of publications in different types of documents i.e. total 1,34,053 publications found

in SCOPUS and 1,33,883 in WOS indexed during 2012 – 16. In depth, the researcher observed that there are 23 Conference papers indexed in SCOPUS and 4045 in WOS; whereas the number of corrections were 1252 in SCOPUS and 1290 in WOS through the review published during 2012 -16.

To fulfil the third objective; that is to identify the most highly productive institutes and organizations of highly cited science journals during 2012-2016, researchers analysed the data of PLOS One Journal from SCOPUS and WOS database to know the productivity of institutes and organization, it is found that the "Chinese Academy of Science" is by far the topmost contributor contributing the Institute with 2,818 SCOPUS and 2,784 WOS publication indexed during 2012 – 2016.

The Country-wise contribution analysis was the fifth objective; hence researchers found out that, the USA is the topmost contributing country with 43,999 indexed in SCOPUS and 43,505 in WOS publications followed by China for 24,562 (SCOPUS) 24,890 (WOS) respectively indexed.

To measure the year-wise growth of publication, researchers analysed, collected data and found that in the year 2013, a huge number of documents were published with 22.84% indexed in SCOPUS and 22.63% in WOS among the total number of publications.

Conclusion:

This research has been conducted to identify highly cited journals i. e. PLOS One especially from science disciplines indexed by SCOPUS and Web of Science databases. PLOS One (Public Library of Science) is the most popular journal which is available online and has unlimited scholarly articles. The researchers analysed the data using sorting, filtering, excluding and delimiting the functions to the data collected.

The researchers have set down objectives to locate the appropriate outcomes as mentioned in the findings above. It is notified from the findings that there are various types of documents published in PLOS One journal i. e. articles, conference papers, reviews, where the maximum number of documents published were from the USA amongst other countries. Whereas the "Chinese Academy of Sciences" is the highly contributing institution as

compared to other institutes. The researcher mentioned in findings that 2013 is the most contributed year from 2012 - 2016. Meanwhile, it is identified that PLOS One is the most scholarly journal which is receiving original research work across the globe.

This study looked at the exposure of WOS and SCOPUS to provide a better view of their coverage characteristics. It is shown that despite the larger coverage of Scopus, the coverage in both databases is unstable between countries and languages and that it may introduce some biases when performing a comparative analysis. These are the significant characteristics that should at least be considered when drawing conclusions using these tools for bibliometric analyses, and perhaps more importantly, for the purposes of research evaluation as well.

Reference:

Books:

Busha, C.H. & Harter, S.P., 1980. Research methods in librarianship: techniques and interpretation, New York: Academic Press. , pp. 56-57.

Kothari, C.R., 2004. Research methodology methods & techniques, New Delhi: New Age International (P) Ltd., Publishers. pp.39

Articles:

Abt, H.A., 2000. The Reference-Frequency Relation in the Physical Sciences. Scientometrics, 49(3), pp.443–45

Adriaanse, L.S. & Rensleigh, C., 201 Comparing Web of Science, Scopus and Google Scholar from an Environmental Sciences perspective. South African Journal of Libraries and Information Science, 77(2).

Ahmadi, A., 2018. Contribution of Indian scientists in PLOS ONE: A scientometric analysis. COLLNET Journal of Scientometrics and Information Management, 12(2), pp.183–196.

Bornmann, L., Haunschild, R. & Hug, S.E., 2017. Visualizing the context of citations referencing papers published by Eugene Garfield: a new type of keyword co-occurrence analysis. Scientometrics, 114(2), pp.427–437.

Dess, H.M., 2006. Database reviews and reports: Scopus. Issues in Science and Technology Librarianship, Winter 2006

Garfield, E., 2002. Scientometric indicator data files. A multidimensional machine-readable database for evaluative purposes. Scientometrics, 28(1993), pp.137-150.

Godin, B., 2006. On the origin of bibliometrics. Scientometrics. 68, pp. 109-133.

Holsapple, C., 2008. The Pulse of Multiparticipant Systems. Journal of Organizational Computing and Electronic Commerce, 18(4), pp.333–343.

Norris, M. & Oppenheim, C., 2007. Comparing alternatives to the Web of Science for coverage of the social sciences' literature. Journal of Informetrics, 1(2), pp.161–169.

Rajendran, P., Jeyshankar, R., and Elango, B., 201   Scientometric analysis of contributions to journal of scientific and industrial research. International Journal of Digital Library Services, 1(2), pp. 79-89.

Rosas, S., Kagan, J., Schouten, J., Slack, P. and Trochim, W., 201   Evaluating research and impact: a bibliometric analysis of research by the NIH/NIAID HIV/AIDS Clinical Trials Networks. PLOS One, 6(3), pp. 52-69.

Solla, D., 2000. A study of learning and retention with a web-based IR interface. Journal of librarianship and information science, 37(1), pp.7-16

Van Raan, and A. F. J., & Wouters, P., 2017. Eugene Garfield 1925–2017: Visionary information scientist.

Wang, M.-H., Fu H.Z., and Ho, Y.S., 201   Scientometrics study of scientific productions of Iranian Medical Sciences Universities in Web of Science During 1999-2008. Medical Information Sciences and Technology, 26 (2), pp.355-37

Yadav, J., 1984. The J-shaped distribution of citations. Journal of Documentation. 58(4), pp. 383-395.

Thesis:

Shanthi, J., 2020. Scientometric Analysis of Literature on Aerospace Based on Scopus Bibliographic Database

Shukla, S., 2020. Growth of Biotechnology and Allied Subjects A Scientometric Study.

Website Link:

Retrieved on September 18, 2019, from

Clarivate. (n.d.). Who We Are. http://wokinfo.com/about/whoweare/

Retrieved on September 20, 2019, from

Elsevier. (n.d.). Scopus®. https://www.elsevier.com/en-in/solutions/scopus

Retrieved on September 25, 2019, from

Web of Science platform: Web of Science: Summary of Coverage. (n.d.). https://clarivate.libguides.com/webofscienceplatform/coverage

About Authors:

Kinjal K. Parekh, Working as Library Assistant at Nirma University, Ahmedabad, Gujarat, India. She has more than 4 years of enriching work experience in the Library Profession. Previously she was working with IIM Ahmedabad and INFLIBNET. She has done her M.Phil, MLISc in Library and Information Science from Gujarat University, Ahmedabad, Gujarat. She has attended various Seminars, Workshops and Conferences at National & International levels. Her research interests are Scientometric, Bibliometric analysis, in addition she has interest in application of ICT in Library, Reference Services, On campus and off campus access Facility etc.

Dr. Geeta Girish Gadhvi is a senior Associate Professor and Head at the Department of Library and Information Science, Gujarat University, Ahmedabad. She has 23 years of teaching experience with innovative methods. She was invited for guest lectures, expert talks and as a subject expert by professional bodies and departments of Library and Information Science of various universities. One edited book and 28 scholarly articles and one edited book are at her credit. She has attended national and international conferences and seminars with her profound inputs. She guided 156 students in preparing Information Products and 69 students for research projects and dissertations for suitable degrees. At present 9 Ph.D. scholars are working under her guidance.

Her area of interest is LIS Education, Knowledge Management, Professional Ethics, Philosophy of Dr. Ranganathan and Library Management. She loves to work for all-round development of students, Content analysis and writing for the future generation.

During the lockdown period she invited for 12 national and international webinars as an expert or a panellist. She is graduated from S.N.D.T.Women's University and did her Ph.D. from Banasthali Vidyapith, Jaipur.