

A Bibliometric Analysis of Open Knowledge Resources: A Study

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Abstract

The present paper deals with a Bibliometric analysis of the published literature on Open Knowledge Resources for the period from 2014 to 2019. The data for the study was extracted from the Scival database of the Elsevier. A total of 3943 articles were retrieved for six years. The present paper investigates the year-wise growth, highly ranked authors, highest contributed institutions, most productive journals and geographical distribution of the research output. The result shows that the United States of America has contributed the highest number of articles (885) on Open Knowledge. This study reveals that the highest number of publications were published in the year of 2018, and Piedra, N. of Universidad Técnica Particular de Loja, Ecuador has the highest number (15) of articles with 115 citations during the selected period, i.e. 2014-2019.

Keywords: Open Knowledge Resources, OKR's, OER's, Bibliometric research and Scientometrics study.

1. INTRODUCTION

Sir Francis Bacon has rightly said that “Knowledge itself is power” in his book *Meditationes Sacrae* in 1597. Knowledge empowers us to discover and achieve to make our life more meaningful. It is essential for the development of humans, communities, and nations. If someone is more knowledgeable, then he/she will be the better to deal with situations in life. It builds our confidence and status in society.

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Protection of the Knowledge has been in practice from ancient times when Egyptians reordered the ancient knowledge by Egyptian hieroglyphs between 3400–3100 BC. Later, Johannes Gutenberg's effort of inventing the printing machine in 1440 has made a drastic change in printing evolution which started securing the knowledge in print form.

The scholars have started publishing their intellectual works in the forms of articles, books, reports, and other modes of literary communications to disseminate the works. It has got an opportunity to start commercial publication houses for commercial publishers to earn money by publishing literary works. But, many publishers have made these literary works as closed access, and the readers have to pay high charges to access them to read. Having seen such rigid high charges, the open knowledge concept has been emerged to make them open access to everyone.

In an effort, the Open Knowledge Foundation a non-profit organisation was emerged in 2004 by Rufus Pollock a UK based economist to make the knowledge free and open from the barriers such as access, fee, etc. This initiative made a drastic change and opened the opportunities for scholars to communicate the intellectual works to everyone without any hurdles.

2. WHY OPEN KNOWLEDGE RESOURCES?

Open Knowledge Resources (OKR) comprises content for teaching and learning, software-based tools and services, and licenses that allow open development and reuse of content, tools, and services. OKRs join the other opens - Open Access, Open Source, Open Data, Open Science - in creating a more robust and useful open commons.

The digital environment offers many opportunities for learners to be creative and collaborative with digital content, tools, and services in the learning process. Campuses, organisations, and individuals who receive free education are now making freely available materials and "learning materials" on the web. Connexions, MERLOT and the Massachusetts Institute of Technology (MIT) Open Course Ware have made significant progress in this direction.

India is becoming an active player in the open-source software movement and the availability of OA electronic journals, OA repositories and open sources software-based repositories such as DSpace and ePrints.

Librarians can do a yeoman service as contributors to the open educational commons by creating OKRs themselves and play as a useful partner in the collaborative educational efforts of both instructor and student.

Knowledge can't be compared with any other resource. As Jefferson eloquently phrased it: "He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me".

the literature, top contributed countries, institutions, productive authors, and geographical distribution of the research output. The data has been calculated and represented in tables. Quantitative and inferential methods have been used to analyse the data.

5. ABOUT SCIVAL

Scival is a bibliometric citation database of the Elsevier was started in 2000, the Scival uses Scopus data to analyses the research performance of the individuals. It covers the research performance of the countries, institutions, and individual authors, Scival holds 50 million publication records from more than 22,000 journals of 5,000+ publishers worldwide from 14000 research institutions.

6. REVIEW OF LITERATURE

Pfeffer (2006) has argued in his paper that with the help of information communication technology (ICT), the course materials, scholarly communications, academic-related software should be made available for everyone for free and open access. He has further recommended that making awareness among scholars, academic leaders, and politicians is necessary to promote open knowledge resources. This paper also emphasises the established infrastructure such as repositories, publishing support, and quality control mechanisms to make such works very potential.

Zancanaro, Todesco, and Ramos (2015) have analysed the open educational resources by using Web of Science (WoS), and Scopus databases, the authors have covered 544 papers, by 843 authors, from 338 institutions, from 61 countries during 2002-2013. This study found that the UK has contributed highest number of articles i.e.178 from 44 institutions, Andy Lane and Patrick McAndrew of Open University of United Kingdom have published the highest number of articles i.e.20 each, while the Open University of UK has shared 76 research output, and most of the articles i.e.34 have been published in *International Review of Research in Open and Distance Learning*.

Shetter, Hadagali, and Bulla (2019) have studied the world literature on MOOCs by using Web of Science (WoS) from 2009-2017, the scholars have analyzed 1701 research output, the study was found that the highest number of articles i.e.873 have been made as conference papers which alone shares 51.32 % of the total publications. The majority of the papers penned by the multi-authors between the 3-9 authors group. *The International Review of Research in Open and Distributed Learning* has the highest number of articles i.e.56 with 1887 citations. C. Meinel of Hasso Plattner Institute has penned the highest number of articles i.e.23. The United States of America and Spain are the highest contributed, which shares 39% with 458 and 196 publications respectively.

Le et al. (2019) in his article evaluated the global scientific outputs of open innovation from 2003 to 2017 and used the literature from Web of Science, the online version of the Social Science Citation Index (SSCI) database. The

researchers have analysed 1,046 publications from 318 journals. They have analysed the contribution of authors, annual production, document type, language distribution of publications, page count, number of REFERENCES, the geographical distribution of research output, and keywords. The authors found that the USA is the top producing country with 21% followed by the UK 16% both are alone share the 37% of the total publications; the researchers identified 34 keywords appearing frequently; the highest frequently keyword was “open innovation” (569 times), followed by “innovation” (110),

7. DATA ANALYSIS

7.1 Year-wise Growth of the World

Table-1 presents the data of worldwide growth of the Open knowledge resources, there are 3943 articles have been published during 2014-2019, the highest number of contribution was made in the year 2018 with 811 articles which share 20.57% of the total publications, followed by 676 in 2016 and 2017, 615 in 2015, and the lowest contributions was found in 2014 with 14.02%. There may be a growth that can be seen in 2019 as data was extracted on 1st November 2019. In 2018, the highest number of articles had been contributed in the field of OKR as the Plan S an initiative to make all the scientific production funded by public grants to make open for all by 2021 was implemented in the same year.

Table 1: Year-wise Growth of the Publications Worldwide during 2014-2019

2014	2015	2016	2017	2018	2019	Total
553	615	676	676	811	612	3943
14.02%	15.60%	17.14%	17.14%	20.57%	15.53%	100%

7.2 Indian Contribution

The table-2 shows the data on the growth of the publication of Open Knowledge Resources in India from 2014 to 2019. The contribution from India was 182 an average of 30 articles in a year. Its show in the year 2017 and 2018 India has contributed the highest number of the article, i.e. 35, followed by 2016, i.e. 30. In 2014 and 2015 contributions from India is, i.e. 28 and 25 respectively. As of now in 2019 it contributes, i.e. 29 articles to the field.

Table 2: Indian Contribution during the Period 2014-2019

2014	2015	2016	2017	2018	2019	Total
28	25	30	35	35	29	182
15.38%	13.75%	16.48%	19.23%	19.23%	15.93%	100%

7.3 Geographical Distribution

The table-3 depicts the country-wise (top 10) distribution of the research articles on Open Knowledge Resources 2014-2019, here articles are analysed according

to their country of origin. Out of 3943 articles, the 10 countries have contributed 3212 articles which share 81.46% of the total output. The table 3 shows that the United States is the most productive country with 885 articles, followed by UK 422, China 310, Germany 292 and India 182 during the period. The USA tops the list because of the Open Access (OA) policy of the country. The USA was adopted the White House's Office of Science and Technology Policy (OSTP) in 2013 which directs all federal agencies to increased public access which is funded by the Federal Governments.

Table 3: Top Ten Countries

Sl. No.	Country	Scholarly output	Citation impact	Citation count
1	United States	885	1.69	7930
2	United Kingdom	422	2.99	7617
3	China	310	1.19	1723
4	Germany	292	1.81	2611
5	Spain	255	1.48	1772
6	Italy	248	1.7	1629
7	Australia	222	1.92	2284
8	Canada	212	1.56	1908
9	France	184	1.79	1255
10	India	182	1.5	1369



7.4 Highly Prolific Authors

Table-4 Indicate among the distribution of authors, the most productive author in Piedra, N. from the Universidad Técnica Particular de Loja who topped the list with 15 publications during the period, followed by Chicaiza, Janneth, Tovar, E., who have contributed 10 articles each during 2014-2019. Auer, Sören has 6

publications, Hernández, Patricia Gómez, López, Carlos Monge, Wang, Tao Yin, Gang have penned 6 articles each. Two authors Abbate, Tindara, Aquilani, Barbara have published 5 articles each in this period. The top two authors are from Universidad Técnica Particular de Loja, Ecuador.

Table 4: Top Ten Contributors

Sl. No.	Author	Affiliation	Country	Output	Citation Impact	Citations
1	Piedra, N.	Universidad Técnica Particular de Loja	Ecuador	15	2.58	115
2	Chicaiza, Janneth	Universidad Técnica Particular de Loja	Ecuador	10	3.03	77
3	Tovar, E.	Universidad Autónoma de Madrid	Spain	10	1.5	68
4	Auer, Sören	Leibniz University Hannover	Germany	6	4.42	150
5	Hernández, Patricia Gómez	University of Alcalá	Spain	6	0.68	4
6	López, Carlos Monge	University of Alcalá	Spain	6	0.68	4
7	Wang, Tao	National University of Defense Technology	China	6	0.52	9
8	Yin, Gang	National University of Defense Technology	China	6	0.52	9
9	Abbate, Tindara	University of Messina	Italy	5	0.42	6
10	Aquilani, Barbara	Tuscia University	Italy	5	0.42	6

7.5 Highest Contributed Institutions

Table 5 depicts the institution wise publications output on Open Knowledge Resources for the period of 2014 to 2019. Top 10 most productive institutions which have published the highest number of research articles on Open Knowledge Resources. Out of the 3943 articles, the first 10 highest ranked institutions have published 324 articles which share 8.21% of the total output during 2014-2019. Among the top 10 institutions, Centre national de la recherche Scientifique (CNRS); France, has published the highest articles, i.e. 56 with 1.86 citation Impact and 397 total citations, followed by Harvard University 52. The Technical University of Madrid has 33 publications and the University of Washington 31, Chinese Academy of Sciences 28. University College London is coming bottom

in this with 24 publications.

Table 5: Highly Contributed Institutions

<i>Sl. No.</i>	<i>Institution</i>	<i>Scholarly Output</i>	<i>Citation Impact</i>	<i>Citation Count</i>
1	CNRS	56	1.86	397
2	Harvard University	52	3.42	1268
3	Technical University of Madrid	33	1.71	200
4	University of Washington	31	1.4	281
5	Chinese Academy of Sciences	28	3.02	386
6	Stanford University	26	5.65	1005
7	CNR	25	1.72	226
8	Imperial College London	25	6.38	1127
9	Delft University of Technology	24	1.28	124
10	University College London	24	2.24	218

7.6 Most Output Published Source

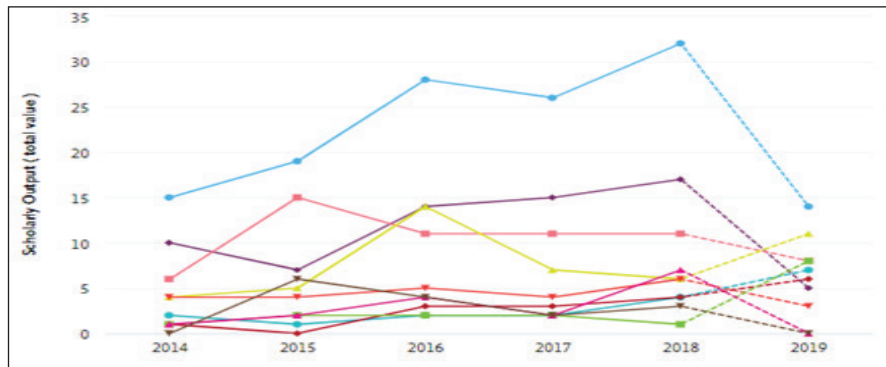
Table 6 presents the top 10 most productive journals which have published the highest number of research articles on Open Knowledge Resources. Out of the 3943 articles, the first 10 highest ranked journals have published 419 articles which share 10.62% of the total output during 2014-2019. Among the top 10 journals Lecture Notes in Computer Science has published the highest articles i.e. 134, followed by, ACM International Conference Proceeding Series 68, CEUR Workshop Proceedings 62, Communications in Computer and Information Science 47, PLoS ONE 26, Advances in Intelligent Systems and Computing 18, Sustainability 17, International Journal of Innovative Research in Computer and Communication Engineering 68, Journal of Medical Internet Research 8th place by publishing 16 articles, Proceedings of the International Astronautical Congress, IAC 16, and ASEE Annual Conference and Exposition, Conference Proceedings 15 during 2014-2019.

Table 6: Top 10 Published Source

<i>Sl. No.</i>	<i>Name of the Published Sources</i>	<i>Scholarly Output</i>	<i>Citation Impact</i>	<i>Citation Count</i>
1	Lecture Notes in Computer Science	134	0.96	466
2	ACM International Conference Proceeding Series	68	0.33	87
3	CEUR Workshop Proceedings	62	0.1	20
4	Communications in Computer and Information Science	47	1.41	62
	PLoS ONE	26	1.18	281

Sl. No.	Name of the Published Sources	Scholarly Output	Citation Impact	Citation Count
	Advances in Intelligent Systems and Computing	18	1.61	10
	Sustainability	17	0.7	66
	Journal of Medical Internet Research	16	0.43	43
	Proceedings of the International Astronautical Congress, IAC	16	0.24	1
	ASEE Annual Conference and Exposition, Conference Proceedings	15	0.3	9

8. FINDINGS



Authors have analysed the research publications on the Open Knowledge Resources indexed in the Scival database for the period from 2014 to 2019. As per the data available on the Scival database, a total of 3,943 articles have been published during the period with an average of 657 publications per year. The contribution of India was 182 which is 22% of worldwide publication during the period. The USA tops the list with 885 articles, followed by the United Kingdom with 422. China is in third place with 310 articles, and India is at the bottom with 182 research outputs. This trend shows that research is mainly held by European countries. In, 2018 the highest number of articles had been published, i.e. 811 and the least contribution can be seen in 2014 with 553.

- The highest number of articles on OKR has been contributed by the affiliated authors of the Centre National de la recherche Scientifique (CNRS); France (56), was highest in this duration followed by Harvard University with 52 publications.
- Piedra, N. from Universidad Técnica Particular de Loja, Ecuador 15 article with 115 citations was the most prolific author with the maximum number of publications during the period followed by Chicaiza, Janneth of Universidad Técnica Particular de Loja with 10 publications 77 citations.

- *Lecture Notes in Computer Science* was the most prolific journal on Open Knowledge Resources which has 134 articles in its account. The highest citation Impact was seen in the journal *Communications in Computer and Information Science* which is 1.41 with 77 publications and 62 citations.

9. CONCLUSION

The main objective of this study was to know the publication trends of Open Knowledge Research. In this study, the researchers have studied the published data on OKR using the Scival database. The present paper shows the profile as well as the characteristics of scientific outputs that include the area of open knowledge resources.

This article would help the newcomers who would like to contribute their scientific productions on Open Knowledge Resources. This gives an overview of the trends, collaborators, country-wise contributions, mode of publications, and published sources which would give an idea to the budding researchers in the field of OKR.

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