# RESEARCH OUTPUT ON ALTMETRICS: A SCIENTOMETRIC ANALYSIS

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The present study aimed to analyse the research output on Altmetrics, indexed in Scopus database. A total 867 publications were collected for the study. The study revealed that the number of publications is increasing gradually except 2020, major document type was article (65.86%); most dominant subject area is Social Sciences (65.86%) followed by Computer Science (%); highest number of publications are contributed by United States (29.419%) followed by United Kingdom (14.187%). Altmetrics is the keyword which occur highest numberof times i.e., 566 in the database. Thewall M is the most productive author having 40 number of publications.It also revealed that most preferred language for publication is English, Scientometrics was having the highest number of publications 117(13.495%) followed by Journal of Informetrics 31(3.575).

**KEYWORDS**: Altmetrics; Annual Growth Rate; Frequency of occurrence Scientometric study; VOSviewer

## INTRODUCTION

"Alternative metrics (called altmetrics to distinguish them from bibliometrics) are considered an interesting option for accessing the societal impact of research, as they offer new ways to measure (public) engagement with research output" (Piwowar, 2013). Altmetrics is the analysis of academic performance on the basis of web 2.0 or social web. Altmetrics is the combination of two words i.e., alt + metrics, here alt means alternative. So, this is an alternative metrics to analyse online influence of research output. Altmetric measure the number of times a research output gets cited, liked, tweeted, shared, bookmarked, viewed, downloaded, mentioned, favourited or discussed on different types of web platform. "Altmetrics…. Is a term to describe web- based metrics for the impact of scholarly material, with an emphasis on social media outlets as sources of data" (Shema, Bar-llan & Thelwall, 2014).

In this study an attempt has been made to analyse the research output on Altmetrics indexed in SCOPUS database. The time period for the study is taken as 2012 to 2020, because the data are available on SCOPUS from the year 2012.

## LITERATURE REVIEW

**Bornmann, Lutz (2015)** in his article discussed about altmetrics on microblogging, online reference mangers and blogging. In the article he mainly focused on the correlation between altmetrics count and citation count. For each altmetrics he calculated a meta-analysis for its correlation with traditional count. He found correlation with traditional citation for microblogging, for blog count and for bookmark counts from online reference managers is negligible, small and medium to large respectively.**Erdt etal. (2016)** in their article provide an overview altmetrics landscape, comparing tool features, social media data sources and social media events provided by altmetrics aggregators. They conduct systematic review of the altmetrics literature and analysed 172 articles, 80 studies from altmetrics literature.**Sugimoto etal. (2017)** thoroughly discuss about scholarly use of social media and altmetrics. They divided their study in two parts. In the first part they examined the use of social media in academia. In second part they examined empirical studies of altmetrics, discussed the interpretation of altmetrics, limitation and several variations according to different platform.

**Banshal etal. (2018)** in their article attempted to present of analysis of altmetrics data through a case study of scholarly articles during 2016 published from India. They chose the article which are indexed in web of science and also in research gate. They found that 61% paper indexed in web of science which have entry in Research gate.**Batch M (2018**) in his article did altmetrics analysis top 15 articles of University of Madras having high citation. He tried to find out does the citation score can create impact on social media. He found high correlation between the ranks of citation and altmetrics score via Spearman Rank Correlation metrics.**Shiah E (2020)**in his article aimed to determine whether there any correlation between h-index and the altmetrics score in the plastic surgery literature. They selected 1668 articles in plastic and reconstructive over a 2 years period for their study. They extracted altmetrics, author metrics and h5-index from these articles and they calculate correlation using Spearman's rank correlation co-efficient.**Haseena VKKM(2021)** in their article attempted to showcased the most viewed fifteen scholarly articles of University of Calicut via various social media platforms and which were selected and ranked based on altmetrics intention score in the Dimension database during January, 2021.

## OBJECTIVES OF THE STUDY

The primary objective of this study was to analyse the global research publications on Altmetrics available on SCOPUS database. To evaluate the research publications in Altmetrics, year-wise growth of publication, annual growth rate, form wise distribution, dominant subject area, most productive authors, language and country wise distribution etc will be assessed. Thus, in this regard, following are the objectives of the present study

- To identify the quantitative assessment of productivity in terms of year-wise and form-wise.
- To examine the growth pattern of publications.
- To find out the preferred source and dominant subject area for publications.

- Ranking of keywords based on their frequency of occurrences.
- Ranking of authors and visualize the co authorship network.
- Language wise and country wise distribution.

## METHODOLOGY

In this study, bibliometric methods have been used for analysing data. Data were collected from the SCOPUS database to perform the study. Documents search was performed in the database and search within Article title, Abstracts and Keywords. Data were extracted from the database by using the following search terms TITLE-ABS-KEY ( altmetrics ) AND ( EXCLUDE ( PUBYEAR , 2021 ) ) and 867 data has been found for the study.These 867 records were analyzed using Microsoft Excel software.For creating network visualisation maps from the data a freely available software VOSviewer was used.

The following formula has been used for analyzing different units of scientometrics.

**The annual growth rate (AGR)** is calculated by the following formula and is proposed by (Kumar and Kaliaperumal, 2015)

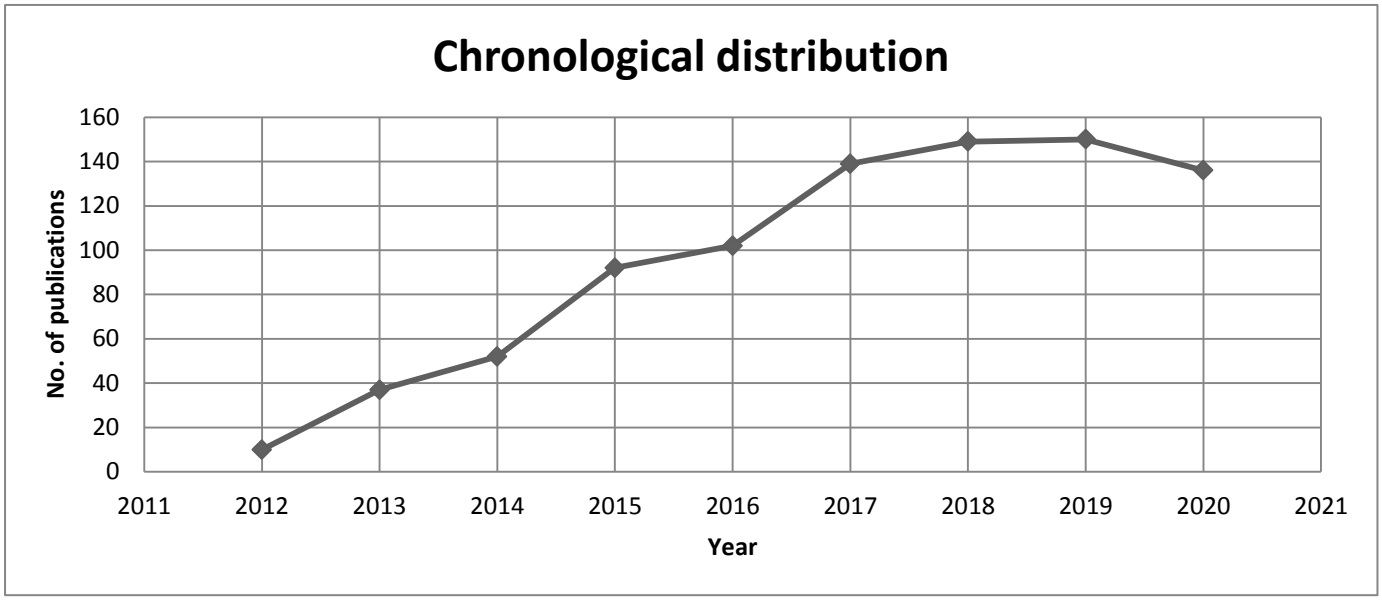
$$AGR = \frac{End\ value - First\ value}{First\ value} * 100$$

## RESULTS AND DISCUSSION

### 5.1. Year wise distribution and Annual Growth Rate

**Table 1: Chronological Distribution of Publications**

| Year | No. of Publications | Percentage | Annual Growth Rate |
|---|---|---|---|
| 2012 | 10 | 1.153 | |
| 2013 | 37 | 4.268 | 270 |
| 2014 | 52 | 5.998 | 40.54 |
| 2015 | 92 | 10.611 | 76.92 |
| 2016 | 102 | 11.764 | 10.87 |
| 2017 | 139 | 16.032 | 36.27 |
| 2018 | 149 | 17.186 | 7.19 |
| 2019 | 150 | 17.301 | 0.67 |
| 2020 | 136 | 15.687 | - 9.33 |
| Total | 867 | 100 | |




A total 867 numbers of research papers were produced and indexed on Altmetrics during 2012-2020. Therefore, the average annual productivity is 96.33 and the productivity is increasing gradually. The year 2019 have maximum research papers 150 (17.301%) while the lowest in 2012 with 10 (1.153%) publications. It has been clear that the highest annual growth rate of research publication on Altmetrics was recorded in the Year 2013(270) followed by the year 2015 (76.92%) and the lowest Annual Growth Rate was recorded in 2020 (-9.33).

### 5.2. Form wise distribution of published research output

**Table 2: Type of document**

| Document type | Record count | Percent |
|---|---|---|
| Article | 571 | 65.86 |
| Conference paper | 142 | 16.37 |
| Review | 55 | 6.34 |
| Editorial | 28 | 3.23 |
| Letter | 24 | 2.77 |
| Book chapter | 19 | 2.19 |
| Note | 12 | 1.38 |
| Conference review | 7 | 0.81 |
| Book | 4 | 0.46 |
| Short survey | 3 | 0.35 |
| Erratum | 1 | 0.12 |
| Undefined | 1 | 0.12 |
| Total | 867 | 100 |

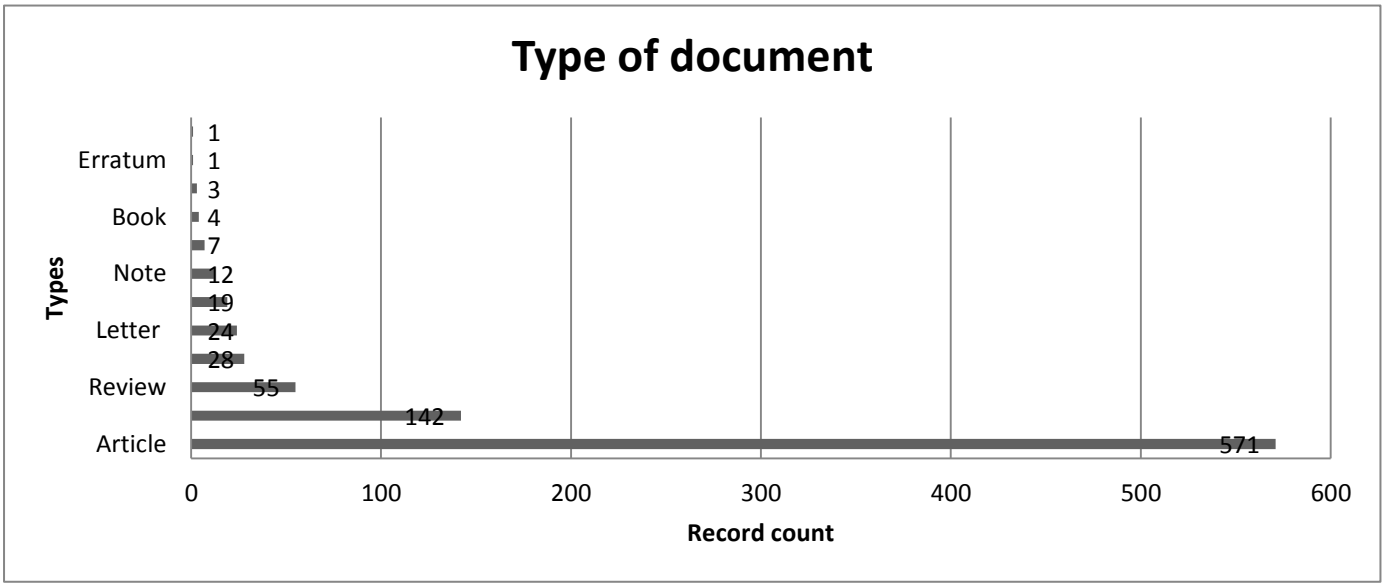



**Figure 2:** Document type wise distribution

Table 2 depicts the type of document preferred for publication of research output on Altmetrics. More than the half of total publications, i.e., 571(65.86%) of the publication published in the form of the article followed by conference papers 142 (16.37%).

### 5.3. Subject area distribution

**Table 3: Top 10 Subject area of publications**

| Subject | Number Count |
|---|---|
| Social Sciences | 509 |
| Computer Science | 437 |
| Medicine | 128 |
| Decision Sciences | 90 |
| Mathematics | 84 |
| Arts and Humanities | 37 |
| Engineering | 37 |
| Biochemistry, Genetics and Molecular Biology | 36 |
| Multidisciplinary | 34 |
| Agricultural and Biological Sciences | 24 |

The table 3 indicated that the Subject "Social Sciences" has the highest number of research papers on Altmetrics, i.e., 509 followed by Computer Science having 437 papers. The subject Medicine is on third position with 128 number of publications followed by Decision Sciences with 90 publications. Arts and Humanities and Engineering departments were having 37 publications followed by Biochemistry, Genetics and Molecular Biology having 36

publications. Multidisciplinary area contributed 34 publications followed by Agricultural and Biological Sciences having 24 publications.

**Ranking of Keywords**

Keywords based on their frequency of occurrences are ranked in Table 4. Only those keywords were represented in the table whose occurrence in the data set is 20 or more than 20. From the dataset a sum total of 2824 unique keywords were retrieved. The table shows that Altmetrics is the keyword which occur highest number of times 566(20.042%) times in the dataset followed by bibliometrics 198(7.01%) times and social media 193 (6.83%) times.

**Table 4: Ranking of keywords based on occurrences**

| Sl. No. | Rank | Keywords | Occurrences | Percentage |
|---|---|---|---|---|
| 1 | 1 | Altmetrics | 566 | 20.042 |
| 2 | 2 | Bibliometrics | 198 | 7.01 |
| 3 | 3 | Social Media | 193 | 6.83 |
| 4 | 4 | Human | 151 | 5.34 |
| 5 | 5 | Social networking (Online) | 104 | 3.68 |
| 6 | 6 | Article | 88 | 3.12 |
| 7 | 7 | Publication | 87 | 3.08 |
| 8 | 8 | Humans | 81 | 2.86 |
| 9 | 9 | Citation analysis | 77 | 2.72 |
| 10 | 10 | Journal impact factor | 76 | 2.69 |
| 11 | 11 | Twitter | 75 | 2.65 |
| 12 | 12 | Scholarly communication | 62 | 2.19 |
| 13 | 13 | Scientometrics | 60 | 2.12 |
| 14 | 14 | Publishing | 59 | 2.09 |
| 15 | 15 | Research evaluation | 56 | 1.98 |
| 16 | 16 | Periodicals as topic | 46 | 1.63 |
| 17 | 16 | Mendeley | 46 | 1.63 |
| 18 | 17 | Open access | 43 | 1.52 |
| 19 | 19 | Web of science | 39 | 1.38 |
| 20 | 19 | Impact factor | 39 | 1.38 |
| 21 | 20 | Attention | 38 | 1.34 |
| 22 | 20 | Research | 38 | 1.34 |
| 23 | 21 | Priority journal | 35 | 1.24 |
| 24 | 22 | Peer review | 33 | 1.17 |
| 25 | 23 | Medical research | 30 | 1.06 |
| 26 | 23 | Citations | 30 | 1.06 |
| 27 | 24 | Internet | 29 | 1.03 |
| 28 | 24 | Systematic review | 29 | 1.03 |
| 29 | 25 | Statistics and numerical data | 28 | 0.99 |
| 30 | 25 | Scientific literature | 28 | 0.99 |
| 31 | 26 | Social network | 27 | 0.96 |

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|---|---|---|---|---|
| 32 | 26 | Scopus | 27 | 0.96 |
| 33 | 26 | Impact | 27 | 0.96 |
| 34 | 27 | Research impact | 26 | 0.92 |
| 35 | 27 | Digital libraries | 26 | 0.92 |
| 36 | 27 | Webometrics | 26 | 0.92 |
| 37 | 28 | Scientist | 25 | 0.88 |
| 38 | 28 | Facebook | 25 | 0.88 |
| 39 | 28 | Alternative metrics | 25 | 0.88 |
| 40 | 29 | Information dissemination | 24 | 0.85 |
| 41 | 29 | Medical literature | 24 | 0.85 |
| 42 | 30 | Citation | 23 | 0.81 |
| 43 | 30 | Computer applications | 23 | 0.81 |
| 44 | 31 | Researchgate | 22 | 0.78 |
| 45 | 32 | Education | 21 | 0.74 |
| 46 | 32 | Visibility | 21 | 0.74 |
| 47 | 33 | Metrics | 20 | 0.71 |

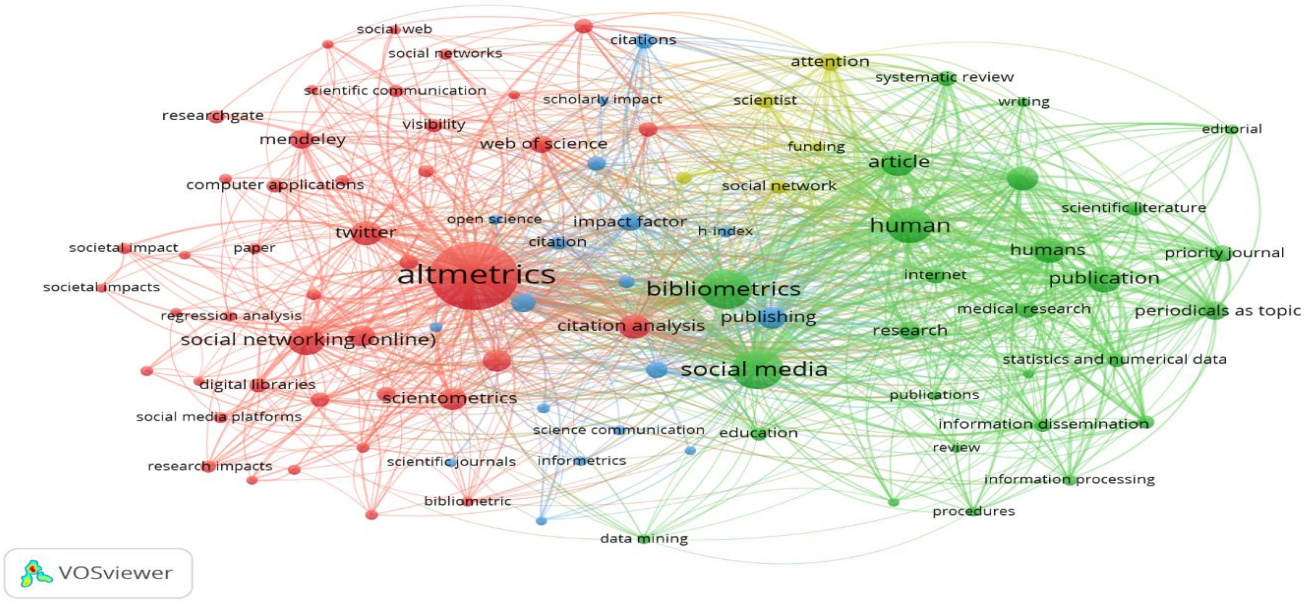


**Figure 3:** Keyword occurrences

A graphical visualization depicted for the top keywords with frequency of occurrences20 or more than 20. The visualization is created using VOS viewer software.

**Ranking of Authors**

The following table shows the ranking of authors who contributed 10 or more than 10 articles. From the Scopus dataset, a total of 1559 unique authors were found from 867 documents.

**Table 5: Ranking of authors**

| Sl. No. | Rank | Author | No. of Documents |
|---|---|---|---|
| 1 | 1 | Thewall M. | 40 |
| 2 | 2 | Bornmann I. | 31 |
| 3 | 3 | Haunschild R. | 23 |
| 4 | 4 | Haustein S., | 22 |
| 5 | 5 | Costas R. | 19 |
| 6 | 6 | Peters I. | 17 |
| 7 | 7 | Holmberg K. | 15 |
| 8 | 8 | Bowman T.D. | 14 |
| 9 | 8 | Wang X. | 14 |
| 10 | 9 | Alhoori H. | 12 |
| 11 | 9 | Gorraiz J. | 12 |
| 12 | 10 | Xu S. | 11 |
| 13 | 11 | Theng Y.I. | 10 |
| 14 | 11 | Bar-ilan J. | 10 |
| 15 | 11 | Torres-salinas D. | 10 |
| 16 | 11 | Erdt M. | 10 |
| 17 | 11 | Konkiel S. | 10 |
| 18 | 11 | Ortega J.L. | 10 |

The most productive author with maximum number of contributions i.e., 40 is Thewall M.got the first rank followed by Bornmann I. with 31 contributions of articles got the second rank and Haunschild R with 23 contribution of article and placed at third rank.

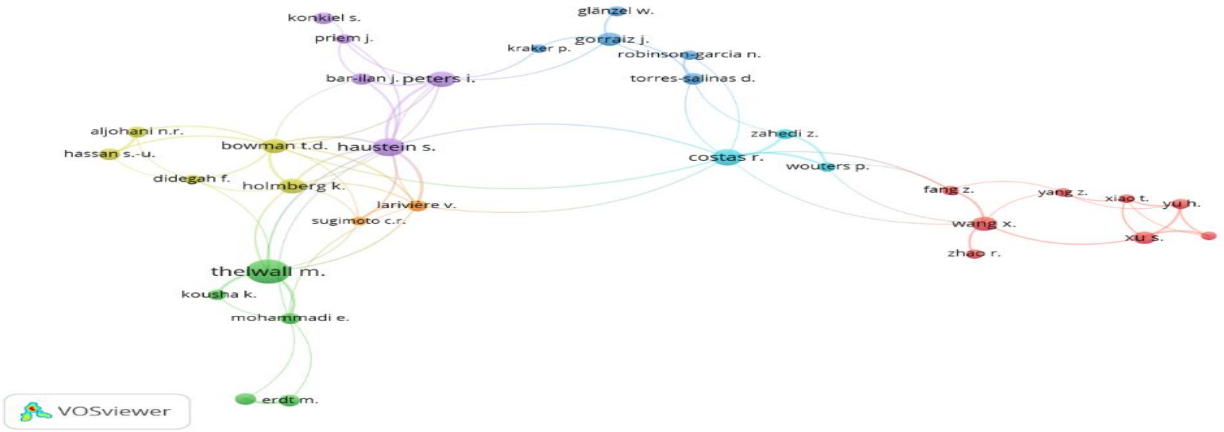


**Figure 4:** Co- authorship visualization

Based on the top contributing authors who contributed 10 or more than 10 articles a co-authorship network is visualized. The co-authorship network is visualized in the figure 4

with the help of VOS viewer software. The figure shows differentdepending on the number of contributions made by respective authors and the lines or edges denotes the number of articles co-authored by a pair of authors as a result of collaboration.

**Country wise distribution of publications**

**Table 6: Top 10 most productive country**

| Country | Number Count | Percent |
|---|---|---|
| United States | 195 | 22.491 |
| United Kingdom | 123 | 14.187 |
| Spain | 87 | 10.035 |
| Germany | 74 | 8.535 |
| China | 73 | 8.42 |
| Canada | 59 | 6.805 |
| Netherlands | 47 | 5.421 |
| India | 44 | 5.075 |
| Iran | 44 | 5.075 |
| Brazil | 28 | 3.229 |
| Total | 774 | 89.273 |

From table 6 we can find out the top 10 productive country on Altmetrics research in India from 2012 to 2020. United States contributed the highest number of publications i.e. 195(22.491%) followed by United Kingdom 123(14.187%), Spain 87(10.035%), Germany 74(8.535%), China (73%), Canada (59%), Netherlands (47%), India (5.075), Iran (5.075) and Brazil 28(3.229%).

**Language wise distribution**

**Table 7: Language wise distribution**

| Languages | Number Count |
|---|---|
| English | 791 |
| Spanish | 36 |
| Portuguese | 20 |
| Persian | 9 |
| German | 6 |
| Italian | 3 |
| Russian | 2 |
| Arabic | 1 |
| Chinese | 1 |

| | |
|---|---|
| Croatian | 1 |
| Dutch | 1 |
| French | 1 |
| Hungarian | 1 |
| Japanese | 1 |
| Slovenian | 1 |

Table 7 depicts the language wise distribution. Maximum literature on altmetrics was produced in the English language (791) followed by Spanish (36). So English is the most used language for publications on Altmetrics.

**Top 10 most preferred source for publications**

**Table 8: Top ten contributing journal**

| **Journals** | **Record Count** | **Percent** |
|---|---|---|
| Scientometrics | 117 | 13.495 |
| Journal of Informetrics | 31 | 3.575 |
| 17th International Conference On Scientometrics and Informetrics Issi 2019 proceedings | 21 | 2.422 |
| Profesional De La Information | 20 | 2.307 |
| Proceedings of the Association for Information Science and Technology | 18 | 2.076 |
| Issi 2017 16th International Conference on Scientometrics and Informetrics Conference Proceedings | 17 | 1.961 |
| Journal of the Association For Information Science and Technology | 16 | 1.845 |
| Plos One | 16 | 1.845 |
| Library Philosophy and Practice | 15 | 1.73 |
| Online Information Review | 14 | 1.615 |
| Total | 285 | 32.871 |

Table 8 revealed the top ten highly productive sources. Scientometrics has the highest number of publications on Altmetrics during the study period contributed 117(13.495%) followed by Journal of Informatrics with 31(3.575%) number of publications. 17th International Conference On Scientometrics and Informetrics Issi 2019 proceedings has 21 (2.422%) publications, followed by Profesional De La Information having 20 (2.307%) publications, Proceedings of the Association for Information Science and Technology with 18 (2.076%) publications, Issi 2017 16th International Conference on Scientometrics and Informetrics Conference Proceedings with 17 (1.961%) publications, Journal of the Association For Information Science and Technology and Plos One with 16

publications, Library Philosophy and Practice with 15 publications and Online Information Review having 14 (1.615%) publications.

## CONCLUSION

The study revealed that increase in the use of social media, implication of Altmetrics is also increasing. Hence the progress in Altmetric research is significant. The research output on Altmetrics has been continuously increasing from 10 publications in 2012 to 150 publications in 2019.The study revealed that the researchers are highly interested in publishing their research in the form of article and in the journal Scientometrics. Social sciences is the mostdominant subject area, maximum number of publications are in English Language, United States contributed the highest number of publications. Altmetrics is the keyword which occur highest number of times i.e., 566 (20.042%) in the dataset, Thewall M is the most productive author having 40 number of publications. The finding of this present Scientometric Study will help the researchers, scientist and policymaker who are directly and indirectly involved in the research work in the field of Altmetrics. In the coming years we can expect more research by implementing Altmetrics.

## REFERENCES


1. Erdt, Mojisola, et al.(2016). Altmetrics: An Analysis of the State – of – the - Art in Measuring Research Impact on Social Media. *Scientometrics*, 109(2), 1117-1166. doi:10.1007/s11192-016-2077-0.
2. Bornmann, Lutz. (2015). Alternative Metrics in Scientometrics: A Meta-Analysis of Research into Three Altmetrics. *Scientometrics*, vol. 103(3), 1123–44. doi:10.1007/s11192-015-1565-y.
3. Sugimoto, Cassidy R., et al. (2017). Scholarly Use of Social Media and Altmetrics: A Review of the Literature. *Journal of the Association for Information Science and Technology*, 68(9), 2037–62. doi:10.1002/asi.23833
4. Banshal, Sumit Kumar, et al. (2018) An Altmetric Analysis of Scholarly Articles from India. *Journal of Intelligent & Fuzzy Systems*, edited by David Pinto et al., vol. 34(5),3111–18. doi:10.3233/JIFS169495.
5. Batch M. (2018). Do citations makes impact on social media? An altmetric analysis of top cited articles of university of Madras, South India. *Library Philosophy and Practice (e-journal)*.,1795.http://digitalcommons.unl.edu/libphilprac/1795
6. Shiah, Eric, et al. (2020). Analysis of Alternative Metrics of Research Impact: A Correlation Comparison between Altmetric Attention Scores and Traditional Bibliometrics among Plastic Surgery Research. *Plastic & Reconstructive Surgery*, 146(5), 664-70. doi:10.1097/PRS.0000000000007270
7. Haseena, VKKM.,& Abdul Azeez, T. (2021). Impact of Scholarly Articles on Social Media: An Altmetrc Mapping of University of Calicut, Kerala, India. *Library Philosophy and Practice*.
8. Santha kumar, R., & Kaliyaperumal, K. (2015). A scientometric analysis of mobile technology publications. *Scientometrics*, *105*(2), 921–939.

https://doi.org/10.1007/s11192-015-1710-7

9. Shema, H., Bar-Ilan, J., & Thelwall, M. (2014). Do blog citations correlate with a higher number of future citations? Research blogs as a potential source for alternative metrics. *Journal of the Association for Information Science and Technology*, 65(5), 1018-1027. doi: 10.1002/asi.2303.
10. Piwowar, H. (2013). Altmetrics: Value all research products. *Nature,* 493(7431), 159-159.