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Research Impact on Drone by means of Scientometric Analysis

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Research Impact on Drone by means of Scientometric Analysis

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Abstract

The Scientometric analysis done on “Drone” is based on the literatures indexed in SCOPUS from 1999 to 2018. The data reveals that 2902 records were published with a total of 2746 Local Citation Score and 16494 Global Citation Score. The Regression test has been conducted to test the hypothesis in an intention to check the deviation among the research publications. The year wise, language wise growth of literature and the type of documents involved in process of publications were assessed. The Bradford’s Bibliometric law was applied to identify the core journals. Top ten countries, ten journals and top five authors were retrieved along with the h-indices. Through the research, it is suggested that the Ministry of Human Resource Development to allocate more funds to enhance the research on “Drone”, as this un-manned vehicle can reach the place where human being hesitate to enter, to unhide many more facts for the smooth and safe life of the living beings in this world.

Keywords: Scientometric - Drone – Regression Test - Bradford’s Law – h-Index

1. Introduction

The rapid growth and the power of the innovation of the human brain and the matchless support of the technology paved way to the unmanned vehicle “Drone”. Initially started to commercialize the video games in the year 2004 by the Parrot Company¹ and later on boomed to reach the various civil and military services. It is proven through media that right from domestic ceremonies to military security service “Drone” are vital products. The navigation and controlled technologies through electronic components embedded in the “Drone” is supporting and extending the services in a unique way through graphical interface. The sensor embedded in Drone can collect data, store and disseminate according to the programmed instructions.² “Drone” embedded with higher end technologies can able to reach the place, where the human being cannot reach or even enter. Mountains or valleys, nautical miles on seas and oceans, drone can be made fly effectively and successfully to complete the allocated tasks. Therefore, to assess the impact of the research on “Drone”, this study has been conducted through the literatures indexed in SCOPUS for ten years from 1999 to 2018. Relevant literatures on scientometric research has been collected and reviewed. Hypothesis has been framed and tested with the regression test to assess the deviation of the growth of literature. Year wise, Language wise growth of literature and the type of documents involved in the process of publication were assessed. Top ten countries, top ten journals and top five authors and their h-indices has been highlighted. The article was concluded with a suggestion to MHRD to allocate more funds to enhance the research on “Drone”.

2. Review of Literature

Scientometric analysis has been conducted on 11 major knowledge management and intellectual capital peer-reviewed journals. It was identified that 2175 number of publications were published by 4236 authors. The study period was divided into two periods and they are 1994-2004 and 2005-2008. During the 2005-2008, the solo publications were decreased from 45% to 34% and at the same time the three authored publications increased from 14% to 20%. The top five countries were USA, UK, Australia, Spain and Canada. The testing of Lotka's Law results that the prediction of Lotka does not fit for this research work.³ A scientometric analysis was done on international Library and Information Science Journals productivity and characteristics. The year from 2000-2004 were taken into account for the study. Appropriate objectives were framed to assess the language wise distribution, subject scatter, average number of references utilized, geographical distribution of contributors, authorship pattern, active authors and citations. The total productivity for the study period was 894. English language played the major role in language wise publications. USA and UK dominated by publishing more number of publications. The percentage of the articles not cited during the study period was 48.77%. It was concluded that the scientific journals could not be assessed on only citation basis but also the expert surveys' has to be considered.⁴ The author has given new insights in the pattern of publications on cloud computing, impact over research through research productivity. Data has been collected from two database viz., SCOPUS and ISI Web of Science for 5 years from 2008 to 2013. The study reveals that the majority of the research output is based on Conference Papers with 49.75% followed by journal articles with 41.69 publications. The research result was very clear to interpret that the current era is dominated by computer science. It was further suggested that the collaboration should be visualized for better understanding and dynamism.⁵ The scientometric study was done in an intention to reveal the present status of nanoscience and nanotechnology. It was observed that 96% of the research outputs are published collaboratedly. France, United Kingdom and India were the most prolific contributors. Indian Institute of Science, Indian Institute of Technologies, Bhabha Atomic Research Centre and National Chemical Laboratory were identified as the most prolific contributors on nanoscience and nanotechnology.⁶

3. Research Design

3.1. Need for the Study

To assess the literature output on "Drone" is to support the researchers doing research on drone. To identify the core journals publishing records on "Drone" and to bring out the real fact about the impact of the research on "Drone", this study has been conducted.

3.2. Methodology

The data about the literatures published on "Drone" has been collected from Web of Science to apply the techniques of Scientometric Analysis. Literatures related to Scientometric Analysis have been analyzed and the bibliographies were entered on the APA style format.

Hypothesis has been framed to apply appropriate statistical test to reveal the deviation of the number of publications.

3.3. Limitation

The assessment of the impact of research is limited for only 10 years (i.e., from 2009 to 2018). The data has been downloaded only from the database “Web of Science” for the research work.

3.4. Hypothesis

H0: There is no significant relationship between the first half and the second half of the records published on Drone from 2009 to 2013 and 2014 to 2018.

4. Analysis & Interpretation

4.1. Year wise Publications

Year of Publications	No. of Publications	Percentage Analysis	Local Citation Score	Global Citation Score
2009	52	2%	83	855
2010	53	2%	108	1052
2011	72	2%	240	1087
2012	84	3%	260	1471
2013	137	5%	320	1666
2014	189	7%	403	2177
2015	308	11%	438	2153
2016	451	16%	440	2886
2017	624	22%	316	2327
2018	932	32%	138	820
Total	2902	100%	2746	16494

Table 4.1. Year wise growth of Research Publications

The year wise research output on Drone reveals a total collection of 2902 for ten years from 2009 to 2018. The percentage analysis of the growth of the research output shown in table number 4.1 is very clear about the inclining nature of the growth. At the outset, the total number of 2902 literatures received 2746 Local Citation Score as well as 16494 Global Citation Score.

4.2 Regression Test

Regression Statistics	
Multiple R	0.99
R Square	0.97
Adjusted R Square	0.96
Standard Error	P-value
0.01	0.01

Table 4.2. Regression Test

The table 4.2 is a proven result of the Regression Test conducted to test the hypothesis framed as “H0: There is no significant relationship between the first half and the second half of the records published on Drone from 2009 to 2013 and 2014 to 2018”. Since, the P-Value of 0.01 is lesser than the critical value of 0.05, the null hypothesis is rejected. Therefore, the alternate hypothesis of “H1: There is a significant relationship between the first half of the records published on Drone from 2009 to 2013 and 2014 to 2018” is accepted.

4.3. Document wise Publications

The table number 4.3 reveals about the document wise publications on “Drone”. A total number of 16 types of documents were involved towards the publication of 2902 literature on “Drone”. Out of which, the document type “article” plays vital role with a maximum publication count of 2248 (77.46%), for which the publications received a total of 2332 Local Citation Score and 13367 Global Citation Score. The “Editorial material” is in the second place with a publication count of 194 (6.69%), for which the materials received 52 Local Citation Score and 246 Global Citation Score. The third place has been occupied by the “News Item” with a publication count of 114 (3.93%), for which the “news item” received a total number of 10 Local Citation Score and 33 Global Citation Score.

Document Type	No. of Records	Percentage Analysis	Local Citation Score	Global Citation Score
Article	2248	77.46%	2332	13367
Editorial Material	194	6.69%	52	246
News Item	114	3.93%	10	33
Book Review	112	3.86%	2	2
Review	106	3.65%	305	2614
Letter	47	1.62%	17	70
Article; Proceedings Paper	40	1.38%	20	92
Meeting Abstract	16	0.55%	0	0
Correction	7	0.24%	0	0
Poetry	7	0.24%	0	0
Article; Book Chapter	3	0.10%	0	10
Review; Book Chapter	3	0.10%	3	53
Art Exhibit Review	2	0.07%	0	0
Music Performance Review	1	0.03%	0	0
Reprint	1	0.03%	5	7
Theater Review	1	0.03%	0	0
Total	2902	100.00%	2746	16494

Table 4.3 Document wise Publications on Drone

4.4. Language wise Publications on Drone

Sl. No.	Language	No. of Publications	Percentage Analysis	Local Citation Score	Global Citation Score
1	English	2764	95.24%	2740	16443
2	Spanish	39	1.34%	5	31
3	German	22	0.76%	1	9
4	Russian	14	0.48%	0	7
5	French	13	0.45%	0	0
6	Korean	13	0.45%	0	0
7	Italian	12	0.41%	0	0
8	Croatian	6	0.21%	0	0
9	Portuguese	6	0.21%	0	1
10	Chinese	2	0.07%	0	0
11	Norwegian	2	0.07%	0	0
12	Polish	2	0.07%	0	3
13	Swedish	2	0.07%	0	0
14	Dutch	1	0.03%	0	0
15	Hungarian	1	0.03%	0	0
16	Japanese	1	0.03%	0	0
17	Slovene	1	0.03%	0	0
18	Ukrainian	1	0.03%	0	0
	Total	2902	100.00%	2746	16494

Table 4.4. Language wise Publications on Drone

It was identified through the table number 4.4 that the Language-wise Publications on “Drone” was dominated by the English language with a publication count of 2764 (95.24%) literatures. The second place has been occupied by the Spanish language with a record count of 39 (1.34%) literatures. The third place has been occupied by the German language with a record count of 22 (0.76%). A total number of eighteen languages were involved towards publishing 2902 number of publications on Drone from 2009 to 2018.

4.5. Top 10 Countries Publications on Drone

The table 4.5 is crystal clear to know that USA was leading the table with a maximum number of publications of 789 literatures with 1023 as Local Citation Score and 5695 as Global Citation Score. United Kingdom holds the second place in publishing more number of publications with a literature count of 274, for which 395 citations were received as Local Citation Score and

1829 as Global Citation Score. Germany was placed in the third place with a record count of 168 records for which the country received 240 as Local Citation Score and 2232 as Global Citation Score. Though, Germany is placed in the third place on publishing lesser number of publications than UK, but has higher Global Citation Score than UK.

Sl. No.	Country	Records	LCS	GCS
1	USA	789	1023	5695
2	UK	274	395	1829
3	Germany	168	258	2232
4	Australia	157	240	1350
5	Peoples R China	151	87	1101
6	Italy	150	125	1063
7	France	131	140	1302
8	South Korea	125	50	465
9	Canada	119	221	1335
10	Spain	100	71	1402

Table 4.5 Top 10 Country wise Publications on Drone

4.6. Top 10 Journals on the Basis of the Number of Publications

Ranking	Journal/Magazine	No. of Records	LCS	GCS
1	New Scientist	65	2	16
2	Sensors	60	0	166
3	Apidologie	55	117	452
4	Remote Sensing	47	63	571
5	Plos One	35	0	326
6	Aerospace America	30	1	2
6	IEEE Communications Magazine	30	47	336
7	IEEE Access	29	11	93
7	Journal of Apicultural Research	29	26	467
8	Journal of Unmanned Vehicle Systems	22	85	153
9	IEEE Spectrum	21	4	18
10	Gim International-the Worldwide Magazine for Geomatics	18	0	0
10	Scientific Reports	18	0	84

Table No.4.6. Ranking of Top Ten Journals/Magazines

The title of the top ten journals/magazines, which were responsible for the publications of research papers on Drone has been identified and tabulated above in the table number 4.6. The journal entitled “New Scientist” published 65 numbers of research papers on “Drone”, for which secured Local Citation Score of 2 and 16 in case of Global Citation Score. The second place has

been captured by the journal entitled “Sensors” with a publication count of 60 publications, for which the journal received a Local Citation Score of nothing and 166 Global Citation Score. The journal entitled “Apidologie” is placed in the third place with a publication count of 55 publications, for which the journal received 117 Local Citation Score and 452 Global Citation Score. Though, the journal entitled “Remote Sensing” published 47 research papers and placed in the fourth place, the journal received maximum Global Citation Score of 571 among the top 10 ranked journals.

4.7.1. Application of the Bradford’s Law of Journal Productivity

No. of Zone	No. of Journals published Articles	No. of Articles
Zone 1	71	751
Zone 2	341	750
Zone 3	747	747
Total	1159	2248

Table 4.7.1 Bradford’s Law of Prolific Journals

The Bradford’s Law has been applied to identify the most prolific journals. The impact of the law conceived by Bradford, segregates the total number of journal articles of 2248 into three zones. The first zone consists of 71 journals with a publication count of 751 articles were identified as most prolific journals towards publishing articles on “Drone”. The second zone, which consists of 341 journals with a publication count of 750 articles are identified as second level of importance among the total number of journals published articles on “Drone”. The third zone, which consists of 747 journals with a publication count of 747 articles are identified as the least productive among the total number of journals published articles on “Drone” according to Bradford.

4.7.2. Top Ten Journals on the Basis of the Bradford’s Law

Ranking on the Basis of Bradford's Law	Title of the Journal	No. of Records
1	Sensors	57
2	Apidologie	53
3	Remote Sensing	44
4	Plos One	35
5	IEEE Access	29
6	IEEE Communication Magazine	28
7	Journal of Apicultural Research	24
8	Scientific Reports	18
9	Journal of Unmanned Vehicle System	17
10	Journal of Intelligent & Robotic Systems	16

Table 4.7.2. Top Ten Journals of the Zone 1 stated in Table No.4.7.1.

Out of 71 titles of journals available in Zone 1 shortlisted through the application of Bradford’s Law, top 10 journals have been tabulated in Table 4.7.2. The journal entitled “Sensor” leads the table with a maximum number of 57 articles. The second place has been occupied by the journal entitled “Apidologie” with a publication count of 53 articles. The third place has been occupied by the journal entitled “Remote Sensing” with a publication count of 44 articles. Likewise, journal entitled “Plos One” with 35 publications; “IEEE Access” with 29 publications; “IEEE Communication Magazine” with 28 publications; “Journal of Apicultural Research” with 24 publications; “Scientific Reports” with 18 publications; “Journal of Unmanned Vehicle Systems” with 17 publications and “Journal of Intelligent & Robotic Systems” with 16 publications shared the slot of the remaining seven places respectively.

4.8. Ranking of Top Five Authors on the Basis of the Productivity with h-Index

Ranking	Author	Brief Information about Author	No. of Records Published	Local Citation Score	h-Index (LCS)	Global Citation Score (GCS)	h-Index (GCS)
1	Oldroyd, Benjamin. P	University of Sydney, Australia	21	17	2	174	8
2	Moritz, R.F.A	University of Pretoria, South Africa	18	9	1	239	9
3	Anderson .K	University of Exeter, England	14	23	3	166	7
3	Hambling, David	Scientist, London	14	0	0	2	1
4	Tarpy, David .R	Carolina State University, USA	12	11	2	219	9
5	Floreano, Dario	Ecole Polytech., Switzerland	10	5	1	186	5

Table 4.8. Top Five Authors on the basis of their productivity

Oldroyd, Benjamin P of the University of Sydney, Australia is the most prolific author with a publication count of 21 on “Drone”. His Local Citation Score is 17, for which he received 2 as h-Index and his Global Citation Score is 174, for which he received 8 as h-Index. Moritz, R.F.A. of the University of Pretoria, South Africa published 18 publications on “Drone” and placed in the second place, for which he secured 9 as Local Citation Score and 239 as Global Citation Score and 1 and 9 as h-Index for the Citation Scores, respectively. Anderson. K, University of Exeter,

England placed in the third place with a publication count of 14, for which he received 23 and 166 citation scores for local and as well as Global and 3 and 7 as h-Index, respectively. As stated in the table number 4.8, though, the third place was shared by Anderson. K with Hambling David who also published 14 publications have not been received not even a single Local Citation Score, but at the same time received 2 as Global Citation Score and 1 as h-Index. Tarpy, David .R, Carolina State University of USA published 12 publications on “Drone” to be placed in the fourth place, for which he received 11 as Local Citation Score and 219 as Global Citation Score and 2 and 9 as h-Index, respectively. Floreano, Darion of Ecole Polytech., Switzerland placed in the fifth place with 10 publications, for which he received 5 as Local Citation Score and 186 as Global Citation Score. The h-Index for the Local Citation Score is only one and five in case of Global Citation Score.

5. Findings, Suggestions and Conclusion

The Scientometric analysis done on “Drone” through the literatures indexed in SCOPUS from 1999 to 2018 reveals that 2902 records were published with a total of 2746 Local Citation Score and 16494 Global Citation Score. The P-Value assessed through the Regression Test is 0.01, which is lesser than the critical value of 0.05, therefore it is concluded that there is a significant relationship between the first and second half of the records published on Drone from 2009 to 2013 and 2014 to 2018”. Therefore the deviation among the publications published from 2009 to 2018 is very minimum. Among the 16 type of publications, the journal articles dominated the research on “Drone” with 2248 publications. English language played a predominant role with 2764 publications. USA plays prominent role in publishing more number of research publications on “Drone” with 789 records. The journal entitled “New Scientist” published 65 articles on “Drone” among 1159 journals. According to the Bradford’s Law, the first zone consists of 71 journals with a publication count of 751 articles and this has been identified as most prolific journals towards publishing articles on “Drone”. Oldroyd, Benjamin P of the University of Sydney, Australia is the most prolific author with a publication count of 21 on “Drone”.

Further this study can help the researchers to find out the future number of publications with the Time Series Analysis. The doubling time of the records can also be assessed as the deviation level between the numbers of records published from one year to another year is very minimal. It is also suggested that the Ministry of Human Resource Development to allocate more funds to enhance the research on “Drone”, as this un-manned vehicle can reach the place where human being hesitate to enter towards un hiding many more facts for the smooth and save life of the living beings in this world.

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