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Mapping the Research productivity in University of Petroleum and Energy Studies: A scientometric approach

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Abstract

This study showcases the escalation of research productivity of UPES (University of Petroleum and Energy Studies), Dehradun for the time span of 10 years from 2008 to 2017. In total 892 publications has been retrieved from the Scopus database. Amongst them, 54.82 % are research articles published in scholarly journals and 36.32 % in Conference proceedings. This paper also highlights the research fraternity of UPES who all are active in the research domain, their collaborative works, their productivity in terms of publications, journal citations etc. Findings also reveal that the International Journal of Applied Engineering Research is the most preferred journal and Kumar, A. is the most productive author and has made the highest number of publications.

Keywords: Research Productivity, UPES, Scientometrics, Research output, Publication Productivity

1. Introduction:

Over many years Scientometrics have emerged as an essential tool in evaluating the productivity of an institution or any researcher or to analyze any trend of subject. Scientometrics sometimes overlaps with bibliometrics as it analyses the quantitative aspects of scientific activities and publications. The research fraternity makes the usage of all bibliometric data including citation counts in their subject domain for evaluating different parameters like most preferred journal, most prolific author etc. Citation studies also play a very crucial role in assessing any scholarly output. Simultaneously, the publication year, medium of scholarly output, collaborative patterns etc. are looked-for to be studied in detail to identify the overall research outcome of any institution (Hood and Wilson, 2001). Therefore, the present study aims to identify the performance of the institution under study i.e. UPES (University of Petroleum and Energy Studies), Dehradun in terms of research publication, most prolific author, core journals, degree of collaboration etc. for the time span of 10 years from 2008 to 2017 from Scopus database.

2. Institutional Profile:

University of Petroleum and Energy Studies (UPES) was established in 2003 through UPES Act, 2003 of the State Legislature of Uttarakhand . This university is an UGC recognized and NAAC accredited University. Various courses like B.Tech, BBA, B.A, , B.Des, LL.B are offered at undergraduate level and M.Tech, MBA, M.A, LLM, M. Des programs at post-graduate level. These courses enhance student in various academic fields like cloud computing, mechanical engineering, civil engineering, aerospace engineering, mechatronics engineering, fine arts, big data analytics, public administration, machine design

engineering, computer science, petroleum, graphic and gaming and many more. The faculty of this institution comprises of over 500 national and international faculty members (www.upes.ac.in).

3. Related Works:

Singh, Gupta and Kumar (2005) portray the subject wise distribution, research contribution and impact of research output carried out by the researchers of IIT Roorkee. Overall 901 papers were collected from Science Citation Index during 1993-2001. Findings revealed that 280 papers are from Science & Technology and out of them 23.21% are involved in collaboration. **Varghese and Rajan (2009)** assessed 632 papers published by the researchers of Rajiv Gandhi centre for Biotechnology. In the year 2003-2004 the institute has produced most number of literatures. The study also includes gender wise distribution, author collaboration, most prolific author and the collaboration drift toward joint authorship is extremely indicative. **Sarkhel and Ray Choudhury (2010)** undertook a study based on data downloaded from CAB abstract of the 2807 papers of Bidhan Chandra Krishi Viswavidyalaya published between 1993 and 2007 to scrutinize the most preferred journals, authorship pattern, country wise distribution etc. The study described that among the total output, 2670 are journal article followed by conference paper (92). Maximum numbers of paper were published in the year 2006 and the less number of papers is witnessed in 1993. To analyse the productive year, co authorship pattern, degree of collaboration etc. **Jeysankara, Babu and Rajendran (2011)** commenced a study on the research output of CSIR-Central Electro Chemical Research Institute (CECRI) from 2000 to 2009. On analysing the 12482 papers, the authors find that CECRI published maximum number of publications in the year 2009 and the year 2002 is the less productive year during the study period. Two authored papers are dominant than single authored papers which is a strong indication of collaborative research among the scientists of CECRI. **Kumar and Dora (2012)** analysed the research productivity of IIM Ahmedabad in the time span of 1999-2010. The study aimed to identify the pattern of growth of the literature, authorship ranking, collaboration, most preferable journal and most cited journal by the faculty members. It was observed that the solo research is decreased, and the Indian journals have got less importance by the authors. **Baskaran (2013)** in his study found that the degree of collaboration is very high, and the multi-authored papers are predominant in the research product of Alagappa University during 1999-2011. In terms of subject wise contribution, the material science is at the top of the list followed by physics and chemistry. The university has the highest collaborative link with South Korea. **Devi and Lakshmi (2014)** studied publication productivity of Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) by scanning the data available in the annual report (2001-2010) of the institute. The study reveals that the scientists mainly preferred Indian journals to publish their article. The research work also highlights on most cited journals, impact factor, country wise distribution, collaboration etc. The study of **Gopikuttan and Aswathy (2014)** is based on the literatures produced by Kerala University as incorporated in Web of Science during 2009-2014. The authors give the bright pictures of yearly output of research product, subject wise distribution, core journals, collaboration, articles with most citation etc. The productivity of the institute is much documented in international level. **Gautam and Mishra (2015)** examined the research trend of Banaras Hindu University during 2004-2013 identified 1041 research papers derived from Indian Citation Index. Their study shows that the productivity of the institute is increased with an average of 104.1 publication per year and most of the research is done by joint authors. **Kumar, Dora and Desai (2015)** extracted 760 publications from Scopus database to present the bibliometric profile of Gujrat University in the period of 2004-2013. They analysed the item type distribution, authorship pattern, most preferred publications, most cited papers etc. The authors found that journal is the most favourite form of the publication by the authors and it amounts 83 % of the total output.

4. Research gap:

The research works carried out in this domain are very essential in their own way, but none of the research works has tried to rank the journals according to citations received by them. Also, none of the studies has focused on the publication production of the university under study i.e. UPES. Therefore, this study is the first of its kind.

5. Objectives:

- ❖ To envisage research publication output of UPES from the year 2008 to 2017.
- ❖ To investigate the year wise distribution of publications.
- ❖ To recognize the type of documents used for communicating research.
- ❖ To determine the most preferred journals according to publication.
- ❖ To rank the top five journals according to citations received by the articles.
- ❖ To reveal the most prolific author of the institute.
- ❖ To examine the authorship pattern, the degree of collaboration among the researchers.

6. Methodology:

Bibliographic data of all authors of University of Petroleum & Energy Studies was extracted from SCOPUS database (www.scopus.com), which is one of the most prevalent sources of information that offers abstract and index of publications at a global level. To evaluate the research output of UPES, its publications over a ten-year period from 2008- 2017 were considered for the study. The data was selected by searching for the institutional affiliation ‘University of Petroleum and Energy Studies’ in the Scopus database. The refined result was exported as CSV file and then used for further analysis. The final data contained of 892 publications during the ten years period. Bibliometric software VOS viewer (Van Eck and Waltman, 2010) is used to identify and visualize the co authorship occurrence. The scope of the present study is to evaluate the research productivity of University of Petroleum &Energy Studies and the study is limited to only one database i.e. SCOPUS. The year has limited from 2008-2017.

7. Overall Analysis, Findings and Interpretations of the results

7.1 Publications over the years

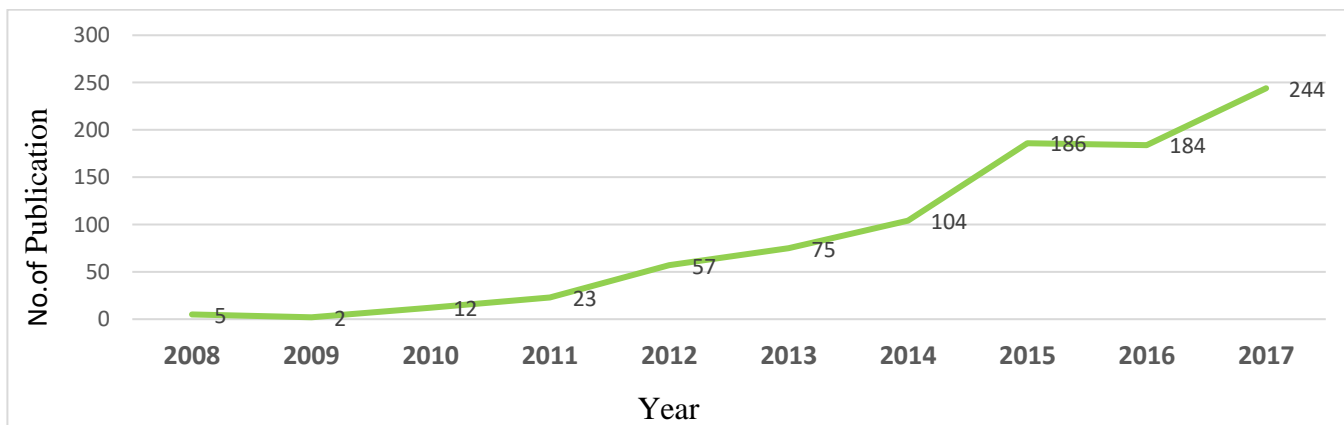


Figure 1- Year wise distribution

The above figure portrays 892 publications incorporated in Scopus database during 2008-2017 from University of Petroleum and Energy Studies. It is found that in 2008 there are 5 articles and it increase gradually except in the year 2009. In the year 2009 only 2 articles are published. The year 2017 is the most productive year with 244 articles followed by the year 2015(20.85%) and the year 2016 with 20.63% of research works.

7.2 Type of Scientific Communication

Table 1- Item type distribution

Sl.No.	Item type	No. of Publications	Percentage
1	Article	489	54.82
2	Conference Paper	324	36.32
3	Review	34	3.81
4	Book Chapter	25	2.80
5	Article in Press	9	1.01
6	Book	4	0.45
7	Business Article	2	0.22
8	Note	2	0.22
9	Editorial	1	0.11
10	Erratum	1	0.11
11	Letter	1	0.11
Total		892	100.00

The productivity of the authors of UPES were spread over variety of scientific communication like journal articles, conference papers, review, book chapters, book, note and so on. The table portray that most of the literature is in the form of journal article (489). The conference paper is at the second position in the list with 324 literatures followed by review (34), book chapter (25) and so on.

7.3 Top 5 Research Journals

Table 2- Top 5 journals according to publication

Sl.No.	Journal Name	No. of Publications	Rank
1	International Journal of Applied Engineering Research	23	1st
2	Biofuels	12	2nd
3	International Journal of ChemTech Research	11	3rd
4	International Journal of Control Theory and Applications	11	3rd
5	Renewable and Sustainable Energy Reviews	10	4th
6	Pollution Research	8	5th

The data collected for the study shows that from the total 892 literatures, 54.82% are articles published in 299 journals. Out of them International Journal of Applied Engineering Research is the most preferred journal with 23 papers. The biofuel journal is at the second position in the list with 12 articles. Both the

journal International Journal of ChemTech Research and International Journal of Control Theory and Applications are at third position with 11 articles each. Pollution Research journal is at the bottom of the list with 8 articles.

7.4 Ranking of top 5 journals according to citation received

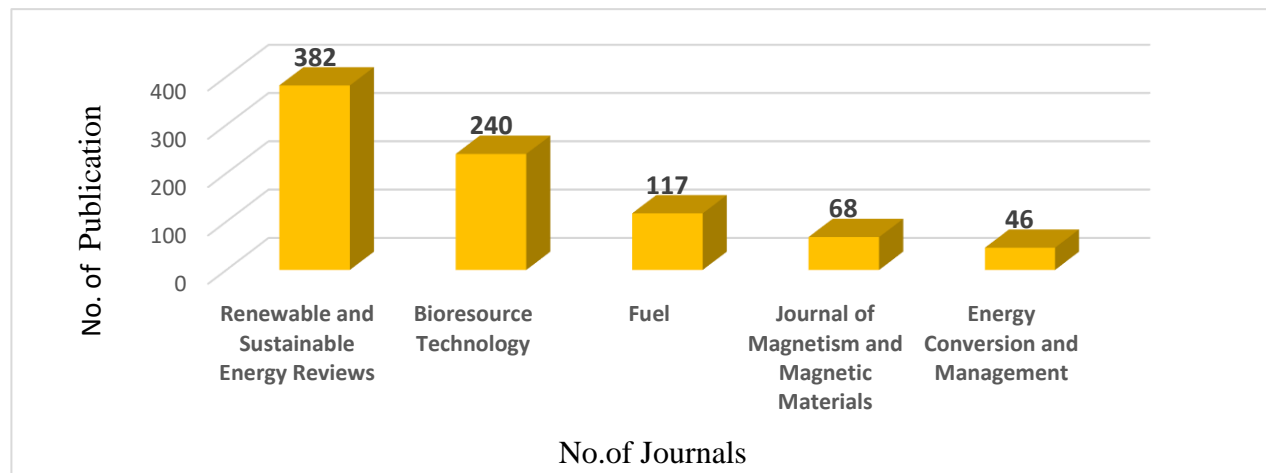


Figure 2- Top 5 highly cited journals

The most productive cited journal can be obtained from the above graph. It vividly depicts that the journal Renewable and Sustainable Energy Reviews has received 382 citation and topped the list. The next position is taken by Bioresource Technology (240) followed by Fuel with 117 citations. The Journal of Magnetism and Magnetic Materials has received 68 citations and take the fourth position. Energy Conversion and Management journal is at bottom of the list with 46 citations. It also notes that the journal named Renewable and Sustainable Energy Reviews ranked highest among the citation received but it holds 4th position in case of publication.

7.5 Top 5 highly prolific authors

Table 3- Top 5 authors

Sl.No.	Name of the Author	No. of Publications	Rank
1	Kumar A.	58	1st
2	Guyen U.	43	2nd
3	Singh R.	43	2nd
4	Kumar S.	35	3rd
5	Kuchhal P.	33	4th
6	Awasthi M.K.	32	5th

Table 3 clearly depicts top 5 authors from UPES in the time of 2008-2017. The list is topped by Kumar A. with 58 papers to his credit followed by Guven U. & Singh R. who have 43 articles each. Third rank is occupied by Kumar S. with 35 literatures followed by Kuchhal P. (33) and Awasthi, M. K. (32).

7.6 Authorship Categorization

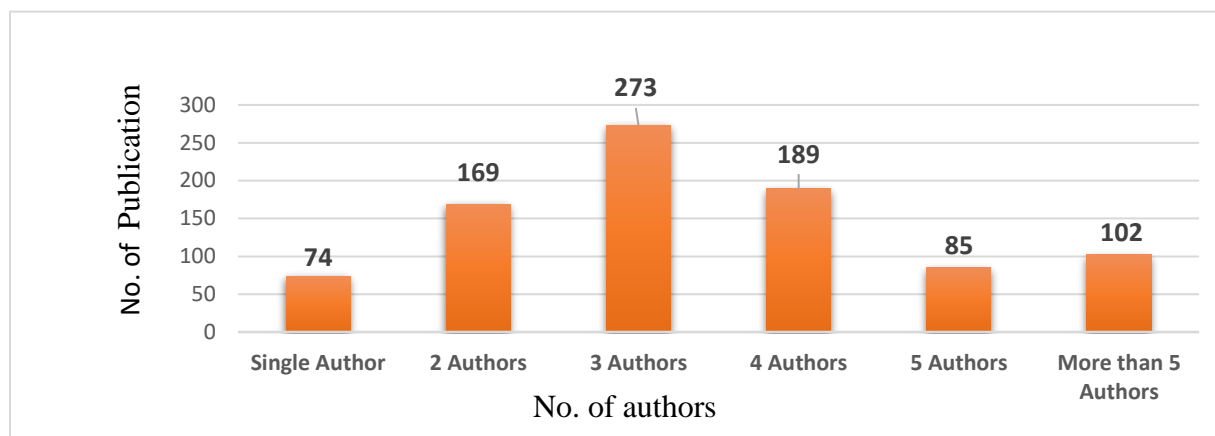


Figure 3- Authorship Pattern

It is observed that 3232 authors have contributed 892 articles and the average author per paper is 0.275. Triple authored papers contribute maximum (273) in number followed by the quadruple authored papers (189). Multiple authored papers have contributed 169 papers followed by sextuple or more authored papers (102). The less number of literature produced by single authored. It clearly indicates that collaborative research has become a well-recognized feature than that of solo research.

7.7 Degree of Collaboration

Table 4- Research Collaboration

Year	Single author	Two authors	More than two authors	Degree of Collaboration	Total
2008	1	2	2	0.80	5
2009	0	1	1	1.00	2
2010	4	3	5	0.67	12
2011	0	6	17	1.00	23
2012	6	19	32	0.89	57
2013	6	26	43	0.92	75
2014	20	20	64	0.81	104
2015	11	31	144	0.94	186
2016	15	25	144	0.92	184
2017	11	37	196	0.95	244
Total	74	170	648	0.92	892

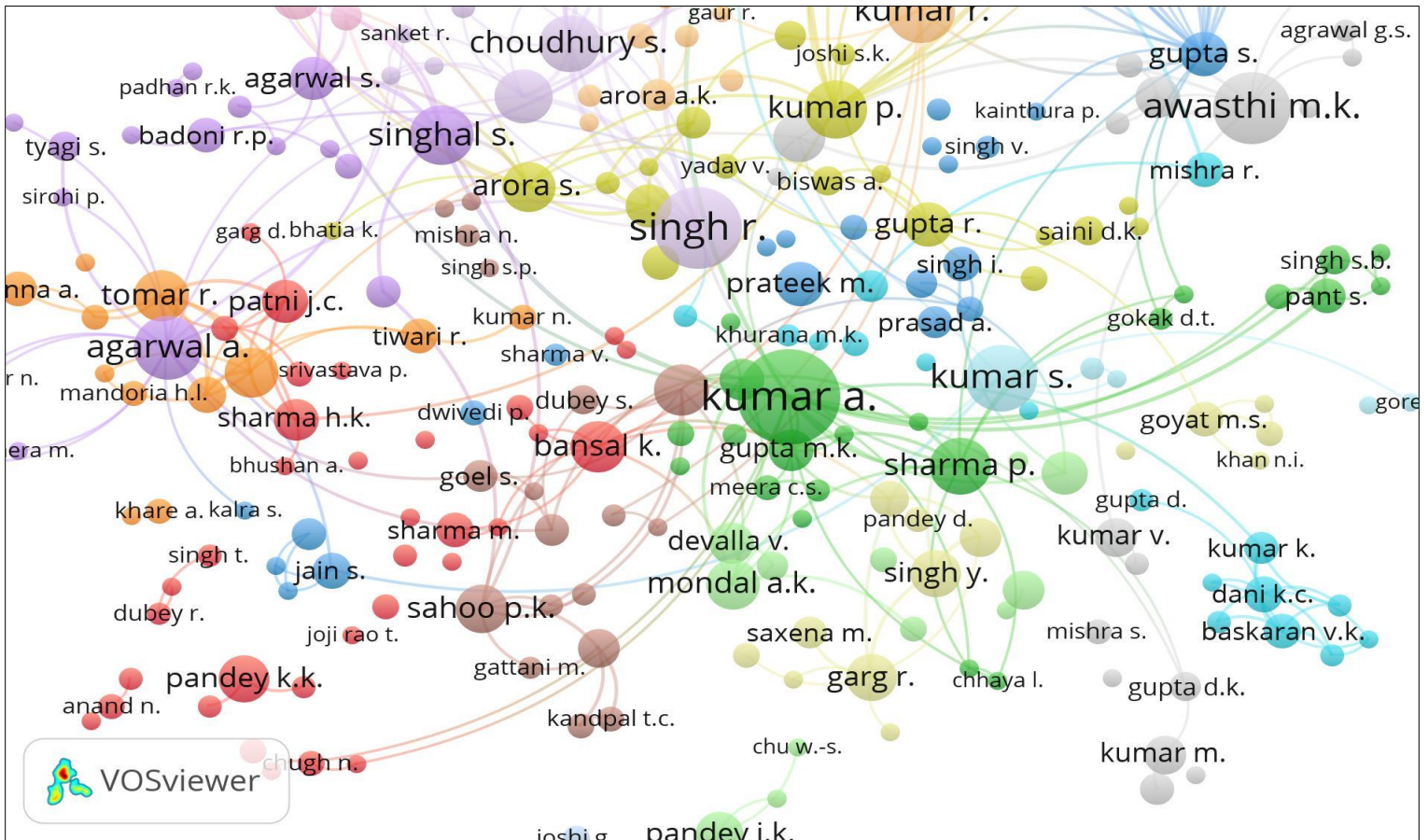


Figure 4- Co Authorship Occurrence Graph

Subramanyam (1983) proposed a mathematical formula for calculating author's degree of collaboration in a discipline. The degree of collaboration among authors is the ratio of the number of papers published in a discipline during certain period.

The degree of collaboration among authors is measured mathematically as;

$$DC = Nm / (Nm + Ns)$$

Where, DC = Degree of Collaboration, Nm = Number of Multiple Authored Papers and Ns = Number of Single Authored Papers)

So, **Degree of Collaboration (DC)** = 818/ (818+74) =0.92

8. Conclusion:

In the present study, the investigation of the research output of University of Petroleum and Energy Studies displays that there has been an overall trend of growth in research publications over the ten-year period (2008-2017). During the study period UPES has published 892 literatures. The study clearly indicates that according to the type of publication by the university, 54.82% of total literatures are published in journals. The trend of collaborative research indicates a constructive atmosphere of collaboration. The analysis also shows that the University published highest number of publication in the year 2017 and it also displays the growth rate of publication during the study period 2008-2017. The authorship pattern of literatures reveals that triple-authored papers are more than multi authored or single authored papers. Most of the papers were written by three or more than three authors. It also observed that among 299 journals International Journal of Applied Engineering Research is the most preferred journal. Kumar, A. is the most productive author and has done 58 publications. The most cited journal is Renewable and Sustainable Energy Reviews with

382 citations, but it ranks fourth according to publication. However, it can be seen from the above analysis and its findings that the authors of UPES are working energetically to rise the number of research products, their publications in referred journals, conference proceedings to establish the institution in the high position in its domain of research.

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