Himachal Pradesh: Research Oriented State as Visualized in SCOPUS

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Abstract

The paper presents a scenario in research activity undertaken by HP based authors solely or in collaboration with other authors at academic and research Institutes of Himachal Pradesh as visualized in SCOPUS. The data retrieved from SCOPUS covers the period 1952-beginning of Jan. 2015. Various parameters like decade wise growth of publications, research productivity of top 10 authors, highly researched subject areas, the most cited papers, citation overview of the extremely preferred journals have been taken into account. This paper finds out the top 4 districts of Himachal Pradesh whose authors have come out with maximum research output. The study reveals that the research gained momentum after 1970 with the establishment of HP University. Out of top 10 authors 7 belong to Himachal Pradesh University. Authors of Himachal Pradesh have worked more in collaboration with the authors of other Indian states than with other International authors. Pure and applied sciences have remained the highly focussed areas of research as compared to Social sciences. Agriculture has emerged as the most researched subject area.

Keywords: Himachal Pradesh, Research Productivity, Scopus

1. Introduction

Himachal Pradesh1, the land of Gods and Goddesses, is endowed with unparalleled natural beauty. Renowned for its majestic hills, refreshing greenery and abundant flora and fauna, it has emerged as the hub of higher education and research. Many State, Central, Private and other Institutes of higher learning offer and promote facilities for learning and undertaking cutting edge research. As reflected by SCOPUS, this paper focuses on the growth of research activities being carried on in Himachal Pradesh. The research output of 159 authors as covered under SCOPUS has been taken into consideration. The research productivity of top 10 authors was further analyzed on the basis of their publications and their citations. Research output of various authors of Himachal Pradesh working solely, collaborating with authors of other Indian States and nations have also been analysed. With this study being undertaken, the districts of the State with maximum research output have also come into light.

2. Objectives

- The broad objective of the paper is to analyze the research productivity of Himachal Pradesh in totality from 1952 to few days of January 2015 as revealed from SCOPUS.
- To analyze the research productivity of top 10 authors of Himachal Pradesh in terms of their publications and citations as covered in SCOPUS
- To find out the top 10 most cited research papers of the authors of Himachal Pradesh.
- To explore the top 10 most preferred journals for consultation in their research work.
- To find out the type of documents in which maximum research has been published.

- Further classification will be analyzed on the basis of subject areas.
- To find out districts of Himachal Pradesh which have generated maximum research output.

3. Methodology

In order to verify these objectives we have selected the secondary data from SCOPUS related to Himachal Pradesh.

SCOPUS2 is the largest abstract and Citation Database of peer-reviewed literature covering 55 million records, more than 20,000 titles and 5000 publishers. It is a product of Elsevier and is a multidisciplinary bibliographical database in the field of Science, technology, medicine, social sciences, arts and humanities.

The time frame of the data retrieved ranges from 1952 till the present decade. Database search was undertaken on Jan. 13, 2015 and the 12383 records were exported from SCOPUS to MS-Excel under various headings like Year, Author, Number of Publications, Subject Areas and Types of documents.

We have not restricted our study to a specific subject instead focused on wide variety of subject areas. Data of 28 Subject areas were available out of which top 10 subject areas individually were taken into consideration and rest have been clubbed together.

Data of 159 authors was retrieved on the basis of at least one author affiliated to an Institution in Himachal Pradesh.

4. Hypothesis

The basic argument of the work is that the primary subject area of research has been pure sciences as against social sciences in which agriculture has the maximum research output.

Secondly maximum number of research work has been undertaken by the authors from HP in collaboration with authors from other states of India as compared to other Nations.

5. Review of Literature

Studies on research based activities of Institutes, Universities, subject areas and states have been reviewed and analyzed by various scholars from time to time. Following is the gist of these research based activities on various domains undertaken by various authors:

A Study was undertaken by Gupta and Dhawan3 to find out India's progress in the research output of Science and Technology. For this data was collected from Scopus for the period of 11 years from 1996 to 2006. Various factors were taken into account like India's share in the World research output, patterns of research communication in Core Indian and International Journals. It also compares the similarity of Indian Research profile with top 20 productive Countries.

Megnigbeto took up 2215 publications covering the period from 1959 to 2011 with at least one author affiliated to Benin were searched from Scopus. The researchers worked on types and languages of publications, authorship, sources and main journals and publication per research field. The study revealed that yearly percentage of international collaboration was 80% with France being the main collaborator. Medicine and agriculture and biological science emerged as the major subject areas of research. This study also suggested the setting up of a National Database to index the domestic scientific literature.

The Research Productivity of state of Odisha has been analyzed by Dash and others. Data was retrieved from Web of Science and covered the Period

from 1967 to 2011. The results revealed that the publications grew steadily up to 1982 and after that the growth was irregular and 2006 onwards there has been swift growth. There has been collaborations with foreign countries too. Research productivity of Institutions has been found out. Results of the study derived from data of various Universities of Odsiha, colleges in Odisha and other new institutions in Odisha.

Gopikuttan and Asvathy portray the research output of University of Kerala. Data was collected from Web of Science and covers a period of 13 years from 2000-2012. The study was conducted on the basis of parameters such as Form wise, Year wise, subject wise, most productive authors and most preferred Journals. The Study reveals that the Research productivity of the University of Kerala is much recognized at global level.

In another study conducted by Xian and Madhavan, the topology of scholarly collaboration and important factors affecting this topology in engineering education research has been taken into consideration.

Idrees and Anwar deployed bibliometric technique to judge the quality and quantity of research publications in Library and Information Science published in the Journal Library Philosophy and Practice. The period under study was from 2006-2012.

A similar attempt has been made by Pandita. He has dwelt upon DESIDOC Journal of Library and Information Technology using Bibliometric techniques, the trends in research publications in Library and Information Science has been adjudged. The time period under study was 2003-2012.

Okonedo and Popoola conducted a study on the effect of self concept, knowledge sharing and utilization of Research productivity among librarians in Public Universities in South West Nigeria. It was found out that Librarians who acquired knowledge through sharing had more potential for research productivity. Research activity has become an integral part of scholarly pursuits. Various bibliometric studies have also been conducted to know about the trends and patterns in the research publications.

From a single Institute, Journal to a State, the analysis of research activity has become an area of focus.

6. Sample Area of Study

Himachal Pradesh1 the pride of Northern India enjoys ideal Geographic location. Spread over an area of 55670 Km^2, It is bordered by Jammu & Kashmir on the North, Punjab on the West and South-West, Haryana and Uttrakhand on the South-East and by the Tibet Autonomous Region on the East. In 1950, Himachal was declared a Union Territory and finally in 1971, it emerged as the 18th State of Republic of India. It is divided into 12 Districts namely Bilaspur, Chamba, Shimla, Una, Solan, Sirmaur, Mandi, Lahaul and Spiti, Kullu, Kangra, Kinnaur and Hamirpur. The literal meaning of the State name is "in the lap of Himalayas". Blessed by nature in terms of abundant beauty it is currently the 3rd fastest growing economy in India. It has been ranked 4th in the list of highest per capita income of Indian States. Enjoying lot of perennial rivers, it sells hydro-electricity to the neighbouring states. The main sources of its revenue are Tourism, Hydropower and Agriculture. Most of its population lives in towns and villages. All sorts of civic amenities, connectivity and services like health and education are being provided to its residents. It is the only State where the use of polythene is strictly prohibited and implemented. From Doordarshan, private FM Stations

to Cellular services provided by various Govt. and Private Operators have made its population Tech-Savvy. Truly Himachal is on the way to all round growth and development. Over the years, higher educational Institutions have come up in large numbers. The State has several higher academic Institutions of repute. It has 1 Central University, 4 State Universities, 11 Privates ones , 1 Indian Institute of Technology 1 National Institute of Technology, 2 Medical Colleges and 1 Homeopathic College. Apart from these, Institute of research like Institute of Himalayan Biosource Technology, Central Potato Research Institute, Indian Institute of Advanced Studies and so on make the State hub of higher education and research.

7. Analysis

The data retrieved from SCOPUS has been presented and analyzed using tables and figures.

7.1 Decade wise research productivity of Himachal Pradesh

Figure 1 depicts the research productivity on and in Himachal Pradesh as retrieved from SCOPUS from 1952-2015. For this the author has divided this period into 6 decades from 1952-2011. The years from 2012 to 2014 have been clubbed together. The research productivity of the month of Jan 2015 has also been taken into consideration. This table reveals that meagre research output was generated in the first decade which merely doubled in the next one. The process gradually gained momentum from 1972 onwards. The phenomenal growth in the research output can be seen in 5th and 6th decades i.e., 1992-2001 and 2002-2011 respectively. The growth progressed from 4% in the decade 1982-1991to 13% in the next decade. It leapfrogged to 46.2% in the following decade i.e., 2002-2011. 33.5% is the research output of short span of 3 years only i.e., 2012-2014. With the establishment of Himachal Pradesh University in 1970, the research productivity has been on an upswing scale. Apart from this, the coming up of Higher academic and research institutions from time to time has also given fillip to this encouraging research scenario.

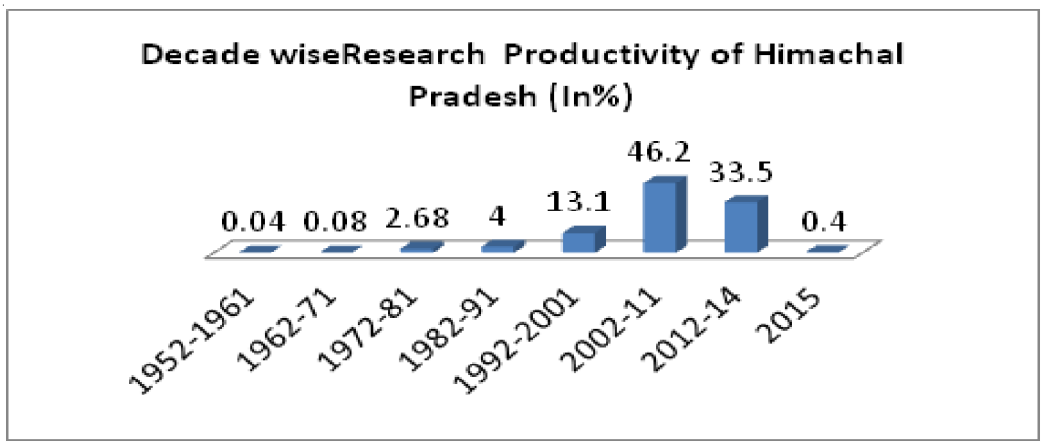

Figure 1: Decade wise research productivity of Himachal Pradesh

7.2 Table 1: Research Productivity of Top 10 Authors of Himachal Pradesh

Author	Affiliation	Subject	No. of Publications	H-Index	Citations
Chauhan, G.S.	Himachal Pradesh University, Shimla	Chemistry	134	22	1525
Sharma, R.C.	Himachal Pradesh University, Shimla	Mathematics	137	15	709
Ahluwalia, P.K.	Himachal Pradesh University, Shimla	Physics	99	9	306
Singh, Bikram V.	Institute of Himalayan Biosource Technology, Palampur	Natural Plants Product Div.	187	22	1814
Misra, B.N.	Himachal Pradesh University, Shimla	Chemistry	116	13	1041
Singh, Baljit C	Himachal Pradesh University, Shimla	Chemistry	127	20	1250
Kaur, I.	Himachal Pradesh University, Shimla	Chemistry	97	14	876
Sharma, M.	CSK HPKV, Palampur	Veterinary Microbiology	73	7	152
Chaudhry, S.C.	Himachal Pradesh University, Shimla	Chemistry	66	7	202
Ahuja, P.S.	Institute of Himalayan Biosource Technology, Palampur		173	21	1853

Analysing the Table 1 the author has focused on top 10 authors from different HP based institutions out of 159 authors as reflected in SCOPUS. Their number of Publications, H-Index and the citations has been taken into consideration. This table indicates that out of top 10 authors 7 are from Himachal Pradesh University and their area of research are pure sciences. Two authors from Institute of Himalayan Biosource Technology, Palampur have earned place in the top 10 list on the basis of their research work. The author from the Deptt. of Veterinary Microbiology in Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur has also bagged a slot amongst the top 10 highly productive authors.

7.3 Table 2: Top 10 highly Cited Papers of Authors of Himachal Pradesh

Pub. Year	Document Title	Authors	Journal Title	Vol	Issue	<2011	2011	2012	2013	2014	2015	Sub total	total
2009	Pretreatments of natural…	Kalia S., Kaith B.S., Kaur I.	Polymer Engineering and Science	49	7	263	116	130	156	161	13	576	839
		Bhushan S., Kalia K., Sharma M.,				14	37	52	65	61	7	222	236
2008	Processing of applepomace..	Singh B., Ahuja P.S.	Critical Reviews in Biotechnology	28	4	4	7	10	15	11	2	45	49
		Pahujani S., Kanwar S.S.,											
2008	Glutaraldehyde activation…	Chauhan G., Gupta R.	Bioresource Technology	99	7	12	8	10	11	14	0	43	55
2008	Mechanistic implications..	Singh B., Sharma N.	Polymer Degradation and Stability	93	3	22	16	17	27	27	3	90	112
2007	Psyllium as therapeutic…	Singh B.	International Journal of Pharmaceutics	##	1-2	31	19	16	9	19	1	64	95
	226Ra, 232Th and	Singh S., Rani A., Mahajan	Radiation										
2005	40K analysis..	R.K.	Measurements	39	4	33	10	10	9	12	0	41	74
	Synthesis,	Chauhan G.S., Guleria L.,											
2005	characterization…	Sharma R.	Cellulose	12	1	33	7	2	5	4	0	18	51
		Kumar A., Kumar M.,											
2003	Natural activities...	Singh B., Singh S.	Radiation Measurements	36	1-6	39	7	10	11	10	0	38	77
2002	Use of novel …	Chauhan G.S., Mahajan S.	Journal of Applied Polymer Science	86	3	33	5	3	2	2	0	12	45
		Mehta I.K., Kumar Sunil,											
1990	Grafting onto isotadic polypropylene.	Chauhan G.S., Misra B.N.	Journal of Applied Polymer Science	41	5-6	42	0	0	2	1	0	3	45

Table 2 reflects that major research work started from 1990 onwards and became highly generative from 2000 onwards. The major areas are pure and applied sciences.

7.4 Table 3: Highly preferred Source Titles

	Indian Journal of Agricultural Sciences	Indian Journal of Animal Sciences	Current Science	Journal of the Geological Society of India	Acta Horticulturae	Indian Veterinary Journal	Indian Journal of Agronomy	Journal of Applied Polymer Science	Aip Conference Proceedings
1996	18	13	112	1074	43	42	12	9252	4
1997	33	26	195	1030	131	61	24	9580	9
1998	44	67	395	995	518	100	48	9991	9
1999	81	116	566	1224	717	100	97	11920	7
2000	91	160	790	1056	1160	147	137	12839	3
2001	115	165	1058	1152	1572	175	190	15195	5
2002	135	225	1318	1387	2106	213	199	16375	4
2003	190	254	1731	1437	2666	242	207	17978	11
2004	178	330	2024	1426	3203	277	194	21051	7
2005	254	400	2657	1378	3871	338	266	23790	186
2006	291	406	3359	1546	4665	366	240	29435	941
2007	361	557	4137	1588	5062	439	271	30355	1746
2008	396	634	4820	1476	6582	534	346	33294	2659
2009	579	656	5998	1813	7441	616	375	34730	3527
2010	600	779	7189	2053	8093	600	405	39363	4583
2011	718	734	8285	2101	9344	643	487	44082	5408
2012	796	926	8511	2368	10674	663	511	46767	6672
2013	853	794	8212	2359	8774	551	588	50399	7415
2014	540	435	5454	1484	5447	247	308	35441	5361

Table 3 covers the top source titles and their citation overview from 1996-2014. As revealed, Journal of Applied Polymer Science has emerged as the most preferred Journal by the researchers for consultation in their own research work followed by Acta Horticulturae. Current Science holds the 3rd slot amongst the highly preferred journals.

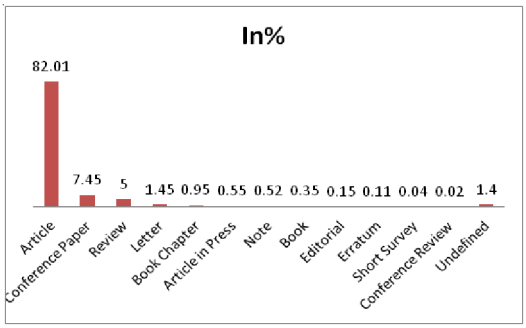

Figure 2: Type of Documents

7.5 Type of Documents

The figure 2 shows the type of document in which maximum research findings have been published. Out of 12383 publications retrieved from SCOPUS 82.01% take the form of articles. 7.45% research has been published in Conference Proceedings followed by 5% in review literature.

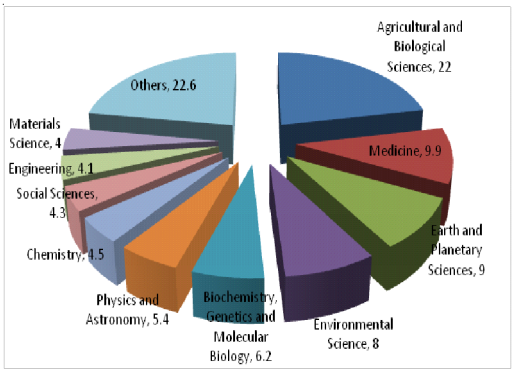

Figure 3: Top 10 highly productive subject areas

7.6 Top 10 Highly Productive Subject Areas

Figure 3 indicates different subject areas in which the research has been undertaken. 28 subject areas related to research work of Himachal Pradesh have been visualized in SCOPUS. The author has taken into consideration top 10 subject areas on the basis of number of publications and the rest 18 have been clubbed together for analysis. Agriculture and biological sciences have emerged as the most sought after domain of research which contributes 22% of the total output. Medicine gives in 9.9% to the research output followed by Earth and Planetary Sciences. Out of top 10, 9 slots have been occupied by pure and allied sciences. Social Sciences contributes only 4.3% to the research productivity. The research output of other 18 subject areas has come out to be 22.6% which is equivalent to Agriculture as a single domain.

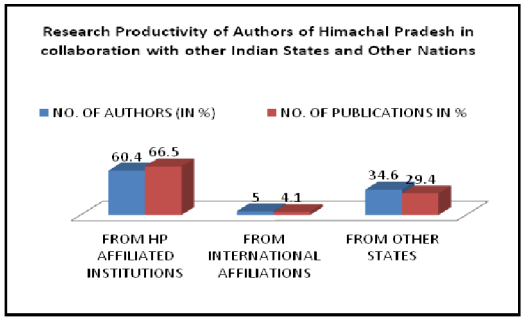

Figure 4: Research Productivity of Authors of Himachal Pradesh in collaboration with other Indian States and Other Nations

7.7 Research Productivity of Authors of Himachal Pradesh in collaboration with other Indian States and Other Nations

For analyzing Figure 4 the author has divided 159 authors into 3 categories i.e., Authors belonging to HP, authors from other Indian States and authors from other Nations. As per the data available we

conclude that maximum authors and maximum publications are from Himachal Pradesh. Out of 159 authors 60.4% are HP based and contributing 66.5% of the total research output. This is followed by 34.6% authors from other states of India who had come up with 29.4% research publications. Only 5% of the authors from other Nations contributed 4.1% to the research productivity of Himachal Pradesh. HP based authors have worked collaboratively with the authors of other Indian States and other Nations.

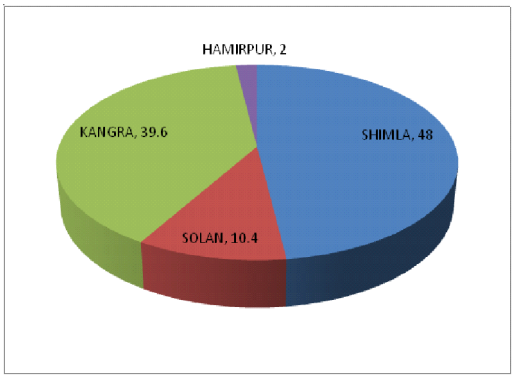

Figure 5: District wise research productivity of Himachal Pradesh

7.8 District wise research productivity of Himachal Pradesh

Figure 5 shows the district wise research productivity of Himachal Pradesh. Out of 12 Districts of Himachal Pradesh Shimla has emerged as the most productive district with 48% of the total research output. Shimla has Institutes of repute like HP University, Central Potato Research Institute, Indira Gandhi Medical College and so on. Followed by Kangra with 39.6% of the total research output. It too has come up as a hub of research with Institutes like Institute of Himalayan Biosource Technology, Palampur, Dr.Rajendra Prasad Govt. Medical College, Tanda, CSKHPKV, Palampur, College of Veterinary and Animal Sciences, Palampur and so on. Solan contributes 10.4% of the research output with Y.S.Parmar Agricultural University, Jaypee University of Information Technology and other newly established private Universities in its territory. Hamirpur has emerged as the 4th productive district of HP in terms of its research output. It is known for its Institutes like NIT and recently established Himachal Pradesh Technical University.

8. Findings and Conclusion

- There has been an impressive growth in research productivity of HP based Institutes which was negligible before 1972. With the establishment of Himachal Pradesh University in 1970, the research process started gaining some speed. The phenomenal growth can be seen after 1992 to 2011. Surprisingly, in a short span of 3years, it contributed 33.5% to the research productivity.
- 7 authors from HP University only have come out with maximum research output amongst the top10 list of authors.
- The major thrust of research is on Pure and applied Sciences as compared to Social Sciences. Agriculture has emerged as the prime domain of research which alone contributes 22% to the total output as compared to 18 subjects clubbed together which contribute 22.6% to the research productivity.
- Authors from Himachal Pradesh have worked more in collaboration with the authors of other Indian states than the authors from other Nations.
- Shimla has been a frontrunner in terms of research output as maximum authors are from Shimla based Institutions. This is followed by Kangra which has Instituions like CSKHPKV,

Palampur, Insitute of Himalayan Biosource Technology. Solan and Hamirpur occupy 3rd and 4th slots respectively.

- On the basis of citation overview Journal of Applied Polymer Science has emerged as the most preferred Journal by the researchers for their research work followed by Acta Horticulturae. Current Science occupies 3rd place in the top 10 list of Journals.
- To conclude, overall research scenario in the hill state of Himachal Pradesh is positive and encouraging. The establishment of higher academic institutions is giving impetus to this dynamic phenomenon. The Sate holds substantial potential for exploring new vistas in diverse domains.

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