

SCIENTOMETRIC ANALYSIS OF FACULTY PUBLICATIONS OF CENTRAL UNIVERSITIES IN THE WESTERN HIMALAYAN REGION OF INDIA

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ABSTRACT -

The current analysis is an effort to assess the research productivity of central universities in India's Western Himalayan region based on research articles indexed by the Scopus database between 2012 and 2021. Various scientometric metrics have been applied to understand the research performance, significant research areas, preferred journals for research communication, highly cited sources, and articles. The data analysis shows that scholarly publications and international collaborations have significantly increased during this period.

Keywords : CUHP; CU Jammu; CU Kashmir; HNBGU; Indian Central Universities; Scientometrics; Scopus; Western Himalayan Region.

INTRODUCTION

The Indian Himalayan Region (IHR) encompasses Jammu and Kashmir, Ladakh, Uttarakhand, Himachal Pradesh, Sikkim, West Bengal, Nagaland, Arunachal Pradesh, Manipur, Mizoram, Tripura, Meghalaya, and Assam (Indian Himalayan Region, 2022). India's Western Himalayan Region (WHR) encompasses three physiographic provinces: Kashmir Himalaya, Himachal Himalaya, and Uttarakhand Himalayas. The Western Himalayan Region is spread across Uttarakhand, Himachal Pradesh, Jammu and Kashmir (Regional Divisions of Indian Himalayas, 2018; Western Himalayas, 2022)

In India, the central universities were established with the explicit goals of academic diversity and excellence with funding from the central government (Central University, 2022). The Indian government established 12 new central universities in 2009–2010 to help its citizens who reside in various regions of the country have access to higher education.

Some state institutions were also given the status of central universities. The University Grants Commission (UGC), established in 1953 to start a planned development of higher education in the nation (University Grants Commission, 2022), supports central universities financially. A distinct act of parliament founded each central university, and each central university operates independently in academic and administrative matters while adhering to the rules of the applicable act. The central universities were established in stages during the 11th five-year plan in 2009. The Parliamentary Standing Committee on Human Resource Development recommended establishing central universities in all remaining states, including the northeastern regions and Sikkim (Parliamentary Standing Committee Report, 2006; Press Information Bureau, Ministry of Human Resource Development, 2014).

The Western Himalayan Region (WHR) has four central universities. The central universities of Himachal Pradesh, Jammu, and Kashmir are the three newly founded central universities, and Hemavati Nandan Bahuguna Garhwal University (HNBGU), formerly known as Garhwal University, is the one that has been converted into a central university. The Central Government meets central universities' entire maintenance and development expenditure. It is essential to see how the central universities have performed. This study uses various Scientometric metrics and tools to analyze the four central universities' research productivity.

REVIEW OF LITERATURE

Few studies have been conducted to examine the research output of Indian institutions. Numerous

bibliometric analyses have also been carried out to evaluate specific research institutes. However, not many studies evaluate and compare the research output of recently founded central universities. A scientometric study of Indian central universities was conducted by Husain & Mushtaq (2011) to discover the growth and development of science and technology research. The study excluded the newly established central universities and highlighted the research trends, annual growth rates, and most productive academics at 18 central universities in India.

Saikia (2021) evaluated the research productivity of central universities in Northeastern India based on data retrieved from the Web of Science for ten years, from 2010 to 2020. The study reveals that Tezpur University has published the highest research publications (33.04%) and received the highest citations and h-index. The study also reveals that the Department of Science and Technology and the University Grant Commission of India provided the most research grants to the central universities in the Northeastern states. Several government entities are also funding several bibliometric studies. Research grants from the Department of Science and Technology and the University Grants Commission of India commissioned a study by Basu et al., (2016). In this study, the authors proposed a “multidimensional Quality-Quantity Composite Index” using bibliometric data for a set of institutions. This index was used to rank the central universities in India.

During the review of related literature, it was observed that there is a growing interest among library and information science professionals in analyzing the research outputs of central universities of India. Marisha et al.,

(2017); Ramadoss et al., (2020); and Pandya et al., (2021) have presented a bibliometric analysis of the research productivity of Indian central universities, including those in the Western Himalayan Region. All four studies were based on the data retrieved from the citation databases. The research performance of India's 39 central universities was provided in the study by Marisha et al., (2017). The research was based on 39 central universities' research publications indexed on the Web of Science for 25 years (1990–2014). The research output of 12 Indian central universities established in 2009 was investigated using bibliometric analysis by Ramadoss et al. (2020) and Pandya et al. (2021). Both studies used the Scopus citation database to download and analyze the research output data. Sonkar et al., (2021) evaluated the nine central universities ranked high in the National Institutional Ranking Framework (NIRF) to understand their research

productivity and impact. The researchers also believed that it is crucial to frequently examine the universities' research outputs using bibliometric tools and approaches.

METHODOLOGY

The main aim of this study is to analyze the research productivity of central universities founded by the Central Government of India. The study's geographical scope is confined to the Western Himalayan Region of India. The data for the study were retrieved from the Scopus database using affiliation ID for ten years, i.e., from 2012 to 2021. A total of 2728 records were retrieved. Each central university's research publication data were retrieved in BibTex format. The RStudio with Bibliometrix (Aria & Cuccurullo, 2017) and Biblioshiny packages were then used to analyze the retrieved data.

ANALYSIS OF DATA

Table 1 : Central Universities in the Western Himalayan Region of India and their research outputs and impact (2012-2021)

S. No.	Name of the University	Total Publications (TP)	Annual Growth Rate	Total Citations (TC)	Average citations per doc	h-index
1	Central University of Himachal Pradesh (CUHP)	560	34.98%	5907	13.7%	42
2	Central University of Jammu (CU Jammu)	597	87.07%	4752	11.01%	36
3	Central University of Kashmir (CU Kashmir)	206	59.01%	892	6.864%	20
4	Hemavati Nandan Bahuguna Garhwal University (HNBGU)	1365	6.77%	11186	10.32%	50

Table 2 : Year-wise research growth and impact of faculty publications

S. No.	Year	CUHP		CUJammu		CUKashmir		HNBGU		Total	
		TP	TC	TP	TC	TP	TC	TP	TC	TP	TC
1	2021	119	2261	150	2088	65	549	238	3921	572	8819
2	2020	108	1484	126	1417	57	197	175	2400	466	5498
3	2019	64	900	104	771	25	83	152	1549	345	3303
4	2018	85	656	117	341	25	41	141	1134	368	2172
5	2017	59	319	67	104	16	11	123	801	265	1235
6	2016	49	159	24	21	8	7	122	536	203	723
7	2015	31	78	4	6	2	1	83	386	120	471
8	2014	15	45	4	4	4	3	91	273	114	325
9	2013	22	5	1	0	3	0	108	169	134	174
10	2012	8	0	0	0	1	0	132	17	141	17
Total		560	5907	597	4752	206	892	1365	11186	2728	22737

The Central Universities of Himachal Pradesh, Jammu, Kashmir, and Hemvati Nandan Bahuguna Garhwal (Central University in Uttarakhand) University's annual research outputs are provided in Table 1, 2 and Figure 1. The researchers from these selected universities have published 2728 research publications between 2012 and 2021. It is observed that 2021, with 572 (20.97%) papers, is the year with the highest document count, followed by 2020, with 466 (17.08%) documents. However, according to the analysis by the bibliometrix (An R-tool), the

Central University of Jammu leads in terms of the yearly growth rate of research publications with 87.07%, followed by the Central University of Kashmir (59.01%) and the Central University of Himachal Pradesh (34.98%). The lowest annual growth rate (6.77%) is at the HNB Garhwal University. However, it has the highest total citations (11186) and h-index (50), followed by the Central University of Himachal Pradesh (TC-5907, h-index-42), Central University of Jammu (TC-4752, h-index-36), and Central University of Kashmir (TC-892, h-index-20).

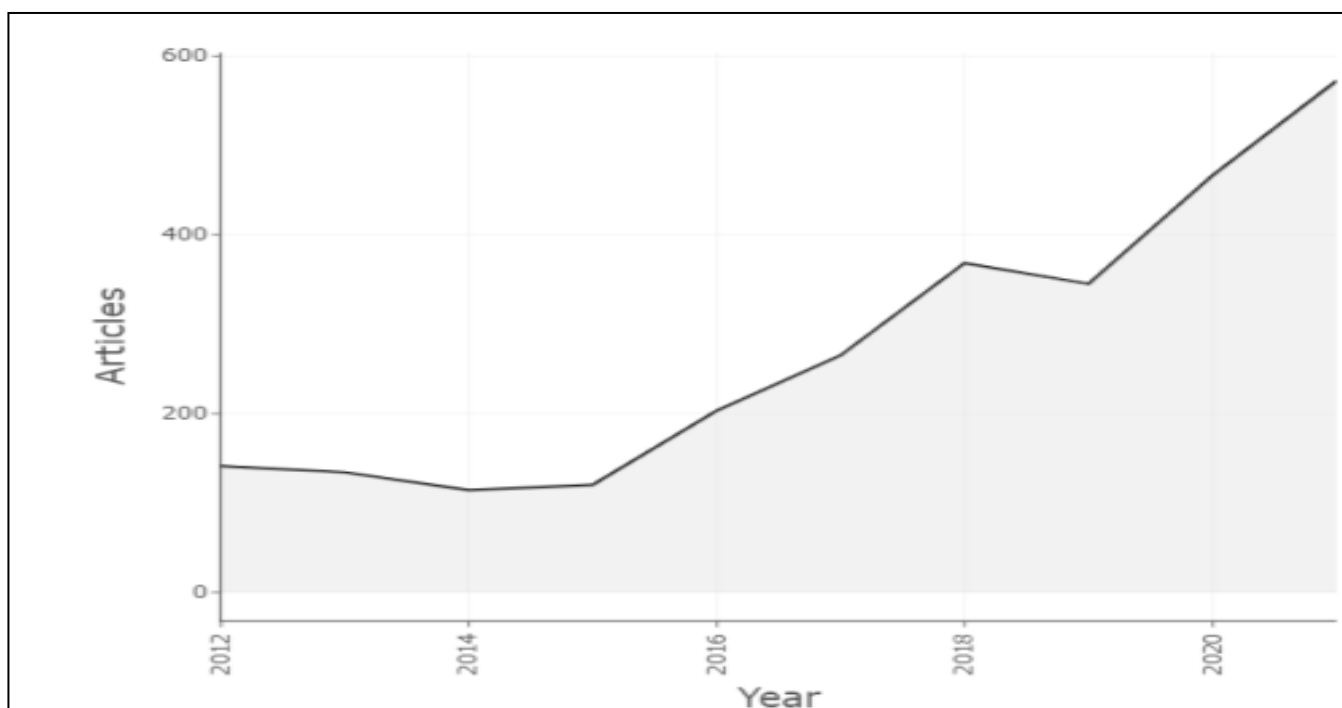


Figure 5: Annual Scientific Production of CUs

Table 3 : Top 10 most preferred journals

Sr. No.	Name of the Journal	TP	Publisher	Country	Discipline
1	AIP Conference Proceedings	45	American Institute of Physics	United States	Physics
2	Plant Archives	34	Dr. R.S. Yadab	India	Plant Science
3	Current Science	29	Indian Academy of Sciences	India	Interdisciplinary
4	Environmental Science and Pollution Research	23	Springer	Germany	Environmental Science
5	Materials Today: Proceedings	21	Elsevier	United Kingdom	Materials Science

Table 3 lists the top five sources that researchers prefer to publish their research outcomes. It is discovered that the AIP Conference Proceedings, published by the American Institute of Physics, received the most documents (45), followed by Plant Archives (34), Current Science (29),

Environmental Science and Pollution Research (23), and Materials Today: Proceedings (21). Additionally, Figure 2 shows the annual occurrences of the top five sources, and Figure 3 displays the clustering of sources according to Bradford's law.

5	Mishra A.P.	HNBGU	40	1031	17
6	Kumar M.	HNBGU	36	306	11
7	Singh R.K.	CUHP	35	2003	23
8	Gangil B.	HNBGU	35	272	12
9	Nautiyal M.C.	HNBGU	35	171	8
10	Kumar P.	CU Jammu	34	1852	23

The top 10 authors (in terms of total publications/documents) are shown in Table 4, along with their Affiliations, Total Citations (TC) and h-index. Rakesh Chand Ramola, Professor of the Physics Department of HNB Garhwal University, has published most research publications (65). Authors from the Central University of Himachal Pradesh, Yusuf Akhter (63) and Deepak Pant (42), are ranked second and third, respectively. Richa Kothari of the Central University of Jammu and A.P. Mishra of the HNB Garhwal University share the fourth position with 40 documents each. Nevertheless,

regarding total citations, the authors listed in Table 3, R.K. Singh from the Central University of Himachal Pradesh, Kumar, Pawan from the Central University of Jammu, and A.P. Mishra from the HNB Garhwal University—hold the top positions. Strangely, none of the Central University of Kashmir authors are listed among the top 25 prolific writers (in total publications). However, with 13 documents (TC-38, h-index-5) to his name, A. M. Wani of the Department of Information Technology, is the university's top author.

Table 5 : Top 10 Subjects Area

S. No.	Subject Area	CUHP	CUJammu	CUKashmir	HNBGU	TP
1	Agricultural and Biological Sciences	37	41	15	437	530
2	Environmental Science	94	87	7	326	514
3	Physics and Astronomy	124	119	18	164	425
4	Engineering	95	158	18	112	383
5	Biochemistry, Genetics and Molecular Biology	90	74	24	175	363
6	Materials Science	83	100	19	121	323
7	Chemistry	55	116	10	135	316
8	Computer Science	36	95	32	69	232
9	Medicine	29	50	22	120	221
10	Mathematics	38	64	38	69	209

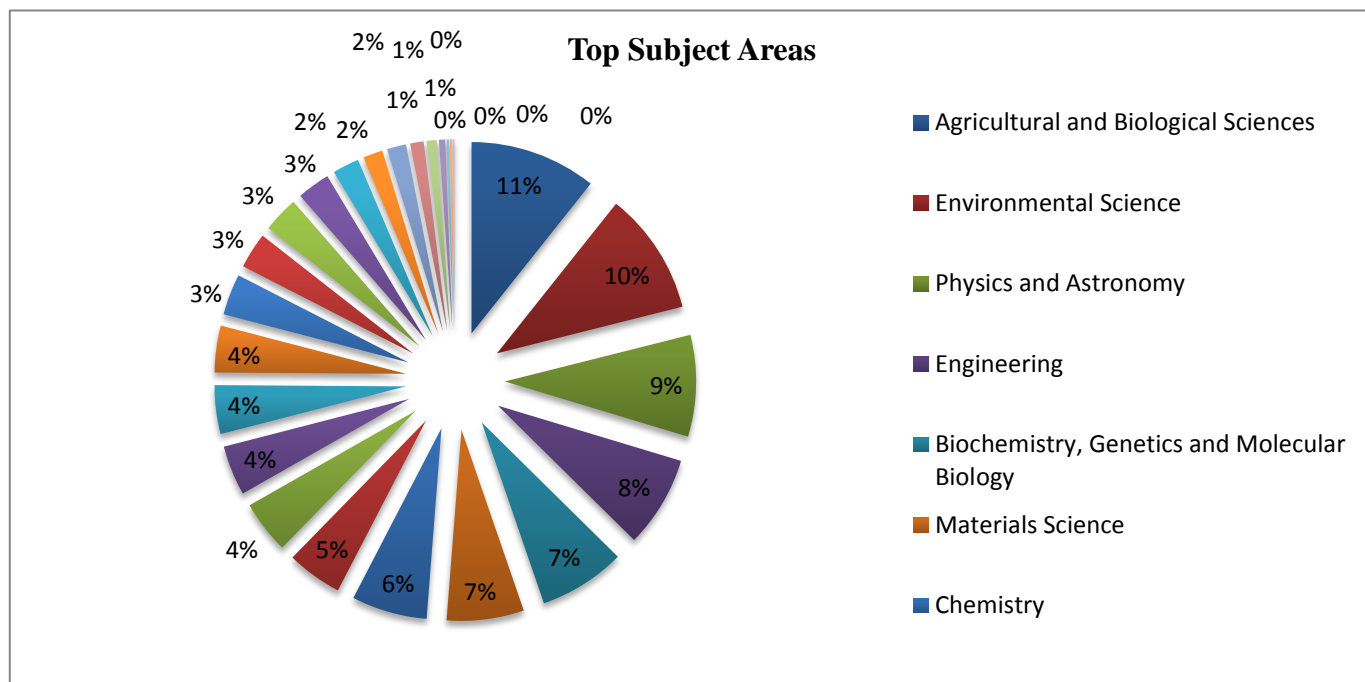


Figure 8 : Subject areas

The subject distribution of the documents that were retrieved over the years can be seen in the data analysis in Table 5 and Figure 4. The subject of Agricultural and Biological Sciences holds the most publications, with 530 (19.43%) in total. The researchers of HNB Garhwal University published 437 (82.45%) documents out of 530 total publications, followed by the Central

Universities of Jammu (7.74%), Himachal Pradesh (6.98%), and Kashmir (2.83%). The following two disciplines on the list are Environmental Science (514) and Physics and Astronomy (425), while Economics, Econometrics and Finance (80) and Arts and Humanities (56) are in the last place.

Table 6 : Most Cited Sources

Sr. No	Name of the Source	No. of Articles Cited	Publisher	Country	Discipline	IF (2021)	SJR (2021)
1	Nature	903	Springer	United Kingdom	Natural science	69.5	17.9 (Q1)
2	Science	827	American Association for the Advancement of Science	United States	Multidisciplinary	63.714	14.59 (Q1)

3	Journal of the American Chemical Society	536	American Chemical Society	United States	Chemistry	16.383	5.73 (Q1)
4	RSC Advances	522	Royal Society of Chemistry	United Kingdom	Chemistry	4.036	0.67 (Q1)
5	Carbon	451	Elsevier	United Kingdom	Materials Science	11.307	1.99 (Q1)

The top five sources that researchers from India's central universities in the Western Himalayan Region have most frequently mentioned or referred to are shown in Table 6. The top three journals are Nature (903), Science (827), and the Journal of the American Chemical Society (536). Six publications from the United States (American Association for the Advancement of Science-01; American Chemical Society-03;

American Physical Society-01; Public Library of Science -01) and four from the United Kingdom (Springer - 01; Royal Society of Chemistry - 01; Elsevier - 02) are included in the top ten journals that the authors of the Central Universities cite. Interestingly, all the top five sources are Quartile 1 journals, as indicated in SCImago Journal Rank (2021).

Table 7 : Highly cited papers

S. No	Paper	Publisher	Year	TC
1	'Green' synthesis of metals and their oxide nanoparticles: applications for environmental remediation.	BMC	2018	666
2	Resveratrol: A Double-Edged Sword in Health Benefits.	MDPI	2018	351
3	Fungal diversity notes 367–490: taxonomic and phylogenetic contributions to fungal taxa.	Springer Link	2016	325
4	Microplastic pollution, a threat to the marine ecosystem and human health: a short review.	Springer Link	2017	311
5	Graphene oxide: strategies for synthesis, reduction and frontier applications	RSC	2016	302

The top five highly cited research publications from selected universities between 2012 and 2021 are listed in Table 7. The top five highly cited articles are collaborative papers that reputable international publishers published between 2016 and 2020; Elsevier published two,

and Springer Link published three. The paper entitled "Green synthesis of metals and their oxide nanoparticles: applications for environmental remediation" published in the Journal of Nanobiotechnology in 2018 received the highest citations, followed by the

"Resveratrol: A Double-Edged Sword in Health Benefits. Biomedicines" published in the Biomedicines in 2018.

Table 8 : Top Collaborating Countries

S. No	Country	CUHP	CU Jammu	CU Kashmir	HNBGU	TP
1	United States	17	24	19	63	123
2	South Korea	11	40	2	17	70
3	China	11	12	1	43	67
4	Italy	9	2	2	52	65
5	Saudi Arabia	11	20	14	20	65
6	Japan	14	4	2	27	47
7	Iran	13	3	1	29	46
8	Brazil	29	3	0	13	45
9	United Kingdom	10	9	2	19	40
10	South Africa	2	22	1	12	37

The top ten countries that collaborate most frequently with India's Central Universities in the Western Himalayan Region are presented in Table 8 and Figure 5. South Korea (70) and China (67) are next on the list after the United States, which has 123 total numbers. The newly founded Central Universities hold the top place

regarding the percentage of international co-authorship. The Central University of Jammu holds the top rank with 28.31%, followed by the Central Universities of Himachal Pradesh (24.64%), Kashmir (23.79%), and HNBG University (21.1%).

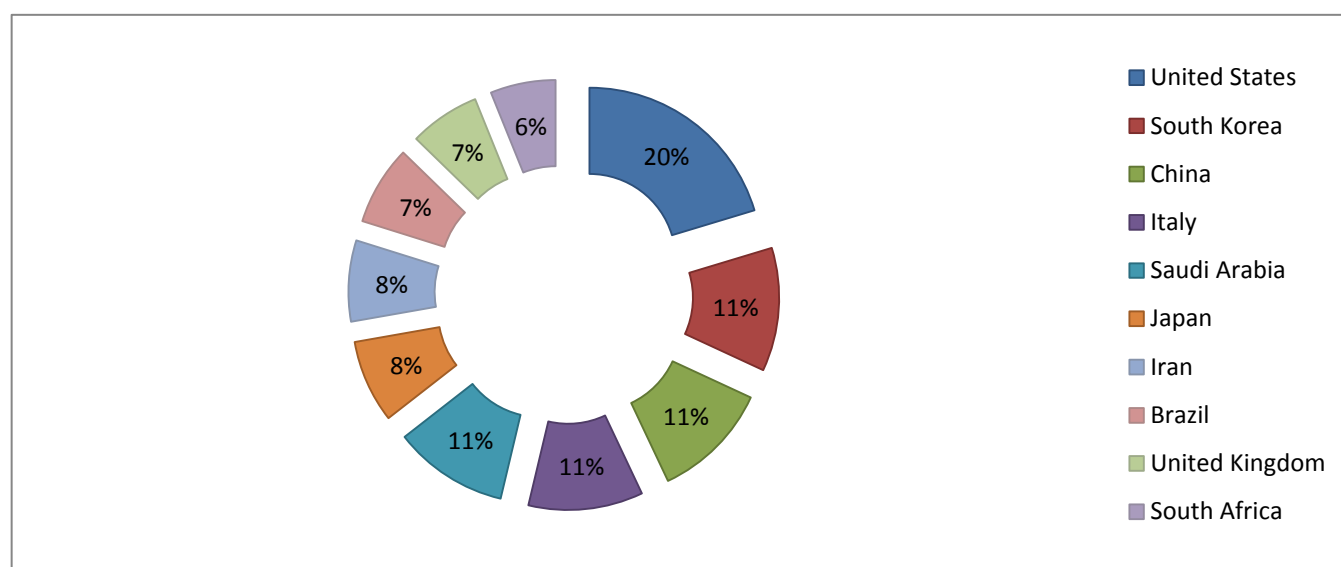


Figure 9: Top Collaborating Countries

international co-authorships of these universities is 23.61%. Furthermore, the largest collaborative country is the USA, followed by South Korea and China.

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