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AUTHORSHIP PATTERN AND COLLABORATIVE RESEARCH WORK OF KUMAUN UNIVERSITY: A SCIENTOMETRIC STUDY OF PERIODICAL LITERATURE

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Abstract:

Purpose: The purpose of the study is to examine the authorship pattern and collaborative research work of the Kumaun University through scientometric methods.

Methodology: The SodhSindhu, Google Scholar and ResearchGate databases are chosen for the data extraction and total 320 articles are downloaded from the databases for the period of 2010 - 2014. Search strings 'Kumaun University', 'Chemistry', 'Physics', 'Botany', 'Geology', 'Name of Faculty Members', 'Year', etc are used to extract the papers. Statistical software SPSS 20 and MS Excel were used for refining, presentation and analysis of the collected data as per the objectives of the study. Statistical tools such as Degree of Collaboration, Collaboration Index and Dominance Factor are used.

Findings: The findings of the study exhibits that there is multi authored papers are dominant and Degree of Collaboration is 0.95. Professor L.M. Tewari of Botany Department is rank one and P.K. Goswami & R. Upadhyay, both Professors of Geology and P.K. Mishra, Assistant Professor of Physics rank first with Dominance Factor (DF) value 1. Each department faculty members are interested for the collaboration within the department and USA and Uttarakhand State of India is most favoured collaborative country and State respectively. However, Collaborative research dominates the pattern of publication with multiple author publications accounting for more than 90% of the total frequency of publication, which proves the hypothesis.

Conclusions: concluded that department should not restrict them for the collaboration within the department or within their state, but they should collaborate with other state of India. Similarly,

they can sign MOU with different developed and developing countries, so that their research publications can increase and best research output can come.

INTRODUCTION

Scientometric is a new branch of knowledge, which uses bibliometric measurements for the evaluation of scientometric progress, level of scientific development, social relevance and impact of the applications of science and technology. The term scientometrics is derived from the Russian term 'naukometria' which means the study of the measurement of scientific and technological process. The term 'scientometric' was coined by Vassily N. N Nalimov in 1960 and has been typically defined as the "quantitative study of science and technology" by **Raan (1998)**.

REVIEW OF LITERATURE

Daud (2016) study purpose was to evaluate authorship and author's collaborative pattern in LIBRI journal with the help of bibliometric tools. The five volumes, twenty issues for the collection of data and 140 research papers were extracted for the period of 2011-2015.

Thavamani and Velmurugan (2013) study examine the authorship pattern and collaborative research work in Annals of Library and Information Studies journal. The said journal 44 issues of 11 volumes were selected and 310 research papers were extracted for the period of 2002-2012.

Elango and Rajendran (2012) study examine authorship and collaborative patterns in the field of marine science. The 506 research papers were recorded from Indian Journal of Marine Sciences 40 issues of 10 volumes were selected for the period of 2001 to 2010.

OBJECTIVE OF THE STUDY

- To identify authorship pattern,
- To identify most prolific authors, and
- To find out research collaboration of researchers at different levels.

HYPOTHESIS

Collaborative Researches Dominates the Pattern of Publication

SCOPE OF THE STUDY

The present research engages with the research output of the faculty of science of DSB Campus, Kumaun University for the period of 2010-2014. The scientometric techniques are applied to know the research productivity of the faculty. There are thirteen departments in the faculty of

science and only four departments namely; Physics, Chemistry, Geology and Botany have been chosen for the present study. The scope of the study is restricted with permanent Faculty Members. Only journals are covered in periodical literature and the study excluded those research publications, which are carried out by the faculties before joining and after leaving the university.

METHODOLOGY

The SodhSindhu, Google Scholar and ResearchGate databases are chosen for the data extraction and total 320 articles are collected from the database for the period of 2010 -2014. Search strings ‘Kumaun University’, ‘Chemistry’, ‘Physics’, ‘Botany’, ‘Geology’, ‘Name of Faculty Members’, ‘Year’, etc are used to extract the papers. Statistical software SPSS 20 and MS Excel were used for refining, presentation and analysis of the collected data as per the objectives of the study. Statistical tools such as Degree of Collaboration, Collaboration Index and Dominance Factor are used.

DATA ANALYSIS

Table 1 shows Authorship Pattern of Faculty of Science, DSB Campus, Kumaun University for the period of 2010 to 2014. Highest numbers of articles are published by three authors with a share of 80 papers (25%) and minimum by single author with a share of 17 papers (5.3%).

Table 1 Authorship Pattern

Frequency of Authors	Frequency of Publications	Percentage (%)
Single	17	5.3
Double	47	14.7
Three	80	25.0
Four	74	23.1
Five	46	14.4
Six	25	7.8
More than Six	31	9.7
Total	320	100.0

Table 2 shows that in year 2013 multi authorship is highest with a share of 73 articles and in year 2010 it is lowest with a share of 52 articles. However, multi authored pattern prevail with a percent share of 94.69. This indicates that in the development of science subject, the collaborative research work is essential.

Table 2 Authorship Type

Authors	Year					Total Publications	Percentage (%)
	2010	2011	2012	2013	2014		
Single	7	4	3	1	2	17	5.31
Multiple	52	63	62	73	53	303	94.69
Total	59	67	65	74	55	320	100

Table 3 we can observe that the average value of degree of collaboration is 0.95. The lowest degree of collaboration is 0.88 in the year 2010 while the value is highest at 0.99 in the year 2013. It indicates that almost all the papers in the year 2013 were multiple authored.

Table 3 Degree of Collaboration

Year	Authorship Type			Degree of collaboration (DC)
	Single (Ns)	Multiple (Nm)	Total Publications (Nm+Ns)	
2010	7	52	59	0.88
2011	4	63	67	0.94
2012	3	62	65	0.95
2013	1	73	74	0.99
2014	2	53	55	0.96
FP	17	303	320	0.95

FP-Frequency of Publications

From the Table 4 we can observe that the collaboration rate varies from the lowest value of 0.61 in 2010 to the highest value of 0.76 in 2013, which indicates a moderately high rate of collaboration.

Table 4 Collaboration Coefficient

	Authorship Type							Total	CC
	Single	Double	Three	Four	Five	Six	More than Six		
2010	7	9	18	12	12	0	1	59	0.61
2011	4	9	20	9	14	6	5	67	0.7
2012	3	9	17	20	7	6	3	66	0.71
2013	1	13	13	22	3	9	13	74	0.76
2014	2	7	12	11	10	4	9	55	0.74

Table 5 provides year wise mean frequency of authors per joint authored paper. We can observe that the collaboration index (CI) varies from the lowest value of 3.11 in 2010 to the highest value of 4.94 in 2014 and average collaboration index is 4.94. This indicates that research team falls from 3 to 5 in the science subjects.

Table 5 Collaboration Index

Collaboration Index			
Year	Multi Authored Papers	Total Authors of Multi Authored Papers	CI
2010	55	171	3.11
2011	63	296	4.70
2012	62	229	3.69
2013	73	359	4.92
2014	53	262	4.94
Total	306	1317	4.30

Table 6 shows trend about prolific authors in different subjects for the period of 2010 to 2014. Thirty four authors contributed 320 research articles during five years of span. The ranking is calculated frequency of publications and dominance factor. L.M. Tewari, Professor of Botany has highest number of publications with a share of 50 papers and rank first. G. Tewari, Assistant Professor of Chemistry and K. Bargali Assistant Professor of Botany contribute equal papers with a share of 18 papers and rank second.

Table 5 also gives prediction about Dominance Factor (DF) and most of the authors, who have low ranking in according to frequency of publications, here they have high ranking. P.K. Goswami & R. Upadhyay, both Professors of Geology and P.K. Mishra, Assistant Professor of Physics rank first with DF value 1. This indicates that all the papers publish by them either they are first author in multi author or single author paper.

Table 6 Prolific Authors

Author's Name	Status	Department	FP	Rank	Mf	Mt	DF	Rank
N. Pande	P	Botany	12	7	0	12	0	-
P.C. Pande	P	Botany	5	11	0	5	0	-
S.C. Sati	P	Botany	12	7	9	12	0.75	2
Y.S. Rawat	P	Botany	9	8	0	9	0	-
S.S. Bargali	P	Botany	9	8	0	9	0	-
L.M. Tewari	P	Botany	50	1	1	50	0.02	
A.B. Malkani	P	Chemistry	7	11	3	7	0.43	5
C. Pande	P	Chemistry	14	5	4	14	0.29	7
C.K. Pant	P	Chemistry	6	11	0	6	0	-
G. Bisht	P	Chemistry	16	4	0	16	0	-
P. Joshi	P	Chemistry	2	13	0	2	0	-
S.P.S. Mehta	P	Chemistry	1	14	0	1	0	-
S. Kumar	P	Geology	9	8	6	9	0.67	

Author's Name (continued...)	Status	Department	FP	Rank	Mf	Mt	DF	Rank
A.K. Sharma	P	Geology	5	11	0	5	0	-
C.C. Pant	P	Geology	9	8	1	9	0.11	12
G.K. Sharma	P	Geology	2	15	1	2	0.5	4
P.D. Pant	P	Geology	8	9	1	8	0.13	11
P.K. Goswami	P	Geology	6	10	6	6	1	1
R. Upadhyay	P	Geology	2	13	2	2	1	1
S. Kumar	P	Geology	9	8	6	9	0.67	3
H.C. Chandola	P	Physics	16	4	0	16	0	-
S. Pant	P	Physics	9	8	0	9	0	-
S. Bisht	P	Physics	8	9	1	8	0.13	11
R. Chandra	ASP	Physics	13	6	3	13	0.23	9
K. Bargali	AP	Botany	18	2	5	18	0.28	8
S. Tamta	AP	Botany	17	3	0	17	0	-
N. Lodhiyal	AP	Botany	8	9	1	8	0.13	11
K. Khulbe	AP	Botany	3	12	1	3	0.33	6
G. Tewari	AP	Chemistry	18	2	4	18	0.22	10
S. Ali	AP	Chemistry	3	12	2	3	0.67	3
B. Pande	AP	Physics	10	8	0	10	0	-
A.K. Durgapal	AP	Physics	3	14	0	3	0	-
P.K. Mishra	AP	Physics	6	12	6	6	1	1
P.S. Negi	AP	Physics	3	14	0	3	0	-

AP-Assistant Professor, ASP-Associate Professor, P-Professor

Mf-first author in multi authored paper, Mt-total multi authored papers

Table 7 shows the national research trend collaboration of Botany Department, DSB Campus, Kumaun University. The result reveal that Department of Botany, Kumaun University, Nainital, Uttarakhand and Regional Research Institute of Himalayan Flora, CCRAS, Tarikhet, Uttarakhand and National Botanical Research Institute (NBRI) Lucknow, Uttar Pradesh are the most collaborative institutions with a share of 95, 19 and 19 respectively.

Table 7 Collaboration with National Institutions by Botany Department

Name of Institutions	Frequency
Department of Botany, Kumaun University, Nainital, Uttarakhand	110
Regional Research Institute of Himalayan Flora, Central Council for Research in Ayurvedic Sciences (CCRAS), Tarikhet, Uttarakhand	19
National Botanical Research Institute (NBRI) Lucknow, Uttar Pradesh	19
Department of Forestry & Environment Science Kumaun University, Uttarakhand	17
Department of Biotechnology, Bhimtal Campus, Kumaun University, Uttarakhand	15
UGC, New Delhi	13

Name of Institutions (continued...)	Frequency
G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) Kosi Katarmal, Almora, Uttarakhand	11
G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand	9
Department of Science and Technology (DST), New Delhi	7
CSIR, New Delhi	6
G.B. Pant Institute of Himalayan Environment & Development, Kullu, Himanchal Pradesh	4
Department of Chemistry, Kumaun University, Nainital, Uttarakhand	3
National Bureau of Plant Genetic Resources (NBPGR), Bhowali, Uttarakhand	4
Uttarakhand Council for Science and Technology (UCOST), Dehradun, Uttarakhand	4
Departments of Space and Biotechnology, Government of India, New Delhi	2
Central Council for Research in Ayurvedic Sciences (CCRAS), New Delhi	3
Department of Forestry, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh	2

Table 8 shows the national research trend collaboration of Chemistry Department, DSB Campus, Kumaun University. The result reveal that Department of Chemistry, DSB Campus, Kumaun University, Uttarakhand, Department of Chemistry, M.B.G.P.G. College, Haldwani, Uttarakhand and Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, Uttar Pradesh are most highest collaborative institutions with a share of 67, 11 and 10 respectively.

Table 8 Collaboration with National Institutions by Chemistry Department

Name of Institutions	Frequency
Department of Chemistry, DSB Campus, Kumaun University, Uttarakhand	67
Department of Chemistry, M.B.P.G. College, Haldwani, Uttarakhand	11
Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, Uttar Pradesh	10
Birla Institute of Applied Sciences, Bhimtal, Uttarakhand	9
G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand	8
Uttarakhand Science Education and Research Centre (USERC), Dehradun, Uttarakhand	8
Department of Pharmaceutical Sciences, Kumaun University, Uttarakhand	7
Department of Botany, University, Nainital, Uttarakhand	4
Department of Science and Technology (DST), New Delhi	3
Department of Biotechnology, Kumaun University, Bhimtal, Uttarakhand	3
Council of Scientific and Industrial Research (CSIR), New Delhi	3
Department of Chemistry, B. H. U., Banaras, Uttar Pradesh	2
Botanical Survey of India (BSI), Dehradun, Uttarakhand	2
Department of Chemistry, Gurukula Kangri University, Haridwar, Uttarakhand	2
Department of Applied Science, Mangalayatan University, Aligarh, Uttar Pradesh	2

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Table 9 shows the national research trend collaboration of Physics Department, Kumaun University. The result reveal that Department of Physics, DSB Campus, Kumaun University, Uttarakhand, Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, Uttarakhand and University Grants Commission (UGC), New Delhi are top three collaborative institutions with a share of 56, 35 and 12 respectively.

Table 9 Collaboration with National Institutions by Physics Department

Name of institutions	Frequency
Department of Physics, Kumaun University, Nainital, Uttarakhand	56
Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, Uttarakhand	35
University Grants Commission (UGC), New Delhi	12
Physical Research Laboratory, Navarangpura, Ahmadabad, Gujarat	10
Laser Diagnostics Division , Institute for Plasma Research, Gandhinagar, Gujarat	10
Tata Institute of Fundamental Research, Mumbai, Maharashtra	5
Tata Institute of Fundamental Research, Udhagamandalam, Ooty, Tamil Nadu	5
Department of Physics, M.B.P.G. College, Haldwani, Uttarakhand	4
Defense Research and Development Organisation (DRDO), New Delhi	4
Indian Space Research Organization (ISRO), Bengaluru, Karnataka	4
National Centre for Radio Astrophysics-TIFR, Pune, Maharashtra	3
Cotton College State University, Panbazar, Guwahati, Assam	3

Table 10 shows the national research trend collaboration of Geology Department, DSB Campus, Kumaun University. The result reveal that Department of Geology, DSB Campus, Kumaun University, Uttarakhand, Department of Science and Technology (DST), New Delhi and Department of Geography, DSB Campus, Kumaun University, Nainital, Uttarakhand are top three collaborative institutions with a share of 38, 24 and 15 respectively.

Table 10 Collaboration with National Institutions by Geology Department

Name of Institutions	Frequency
Department of Geology, Kumaun University, Nainital, Uttarakhand	38
Department of Science and Technology (DST), New Delhi	24
Department of Geography, University, Nainital, Uttarakhand	15
Wadia Institute of Himalayan Geology, Dehradun, Uttarakhand	10
University Grant Commission (UGC), New Delhi	10
Institute of Seismological Research, Gandhinagar, Gujarat	3
Indian Institute of Remote Sensing (IIRS), Dehradun, Uttarakhand	2
Institute of Seismological Research, Gandhinagar, Gujarat	2
Mineral Sales Private Limited (RMML), Baldota Enclave, Hospet, Karnataka	2

Table 11 shows the international research trend collaboration of Botany Department, DSB Campus, Kumaun University. The result reveal that Swedish University of Agricultural Sciences, Uppsala, Sweden, Museo de Ciencias Naturales de A´lava, Vitoria-Gasteiz, Spain, Institute for Nature Conservation of Serbia, Belgrade, Serbia, Faculdade de Cieˆncias de Lisboa, Universidade de Lisboa, Portugal, etc are collaborative international institutions, which equally share of 1.

Table 11 Collaboration with International Institutions by Botany Department

Name of Institutions	Frequency
Swedish University of Agricultural Sciences, Uppsala, Sweden	1
Museo de Ciencias Naturales de A´lava, Vitoria-Gasteiz, Spain	1
Institute for Nature Conservation of Serbia, Belgrade, Serbia	1
Faculdade de Cieˆncias de Lisboa, Universidade de Lisboa, Portugal	1
Instituto Piaget, Campus Universita´rio de Santo Andre´, Portugal	1
Universidad Auto´noma de Madrid, Spain	1
Laboratory of Bryology, Institute of Botany, Polish Academy of Sciences, Krako´w, Poland	1
Botanical Department, Hungarian Natural History Museum, Budapest, Hungary	1
Department of Biology and Ecology, University of Ostrava, Czech Republic	1
Faculty of Biology, Institute of Botany and Botanical Garden, University of Belgrade, Serbia	1
Department of Botany and Nature Protection, University of Warmia and Mazury in Olsztyn, Poland	1
OCB Programme of UNU, Tokyo, Japan	1

Table 12 shows the international research trend collaboration of Chemistry Department, DSB Campus, Kumaun University. The result reveal that only two institutions, namely, Chemistry Department California state polytechnic University Pomona Canada and Epilepsy Branch, National Institute of Neurological Disorders and Stroke, Bethesda, USA have collaborated with a share of 5 and 1.

Table 12 Collaboration with International Institutions by Chemistry Department

Name of Institutions	Frequency
Chemistry Department California State Polytechnic University, Pomona, Canada	5
Epilepsy Branch, National Institute of Neurological Disorders and Stroke, Bethesda, USA	1

Table 13 shows the international research trend collaboration of Physics Department, DSB Campus, Kumaun University. The result reveals that Observatoire de Paris, LESIA, Meudon Principal Cedex, France, NASA Goddard Space Flight Center, Greenbelt, USA and California

State University, Northridge, USA are top three collaborative international institutions with a share of 9, 6 and 6.

Table 13 Collaboration with International Institutions by Physics Department

Name of Institutions	Frequency
Observatoire de Paris & LESIA, Meudon Principal Cedex, France	9
NASA Goddard Space Flight Center, Greenbelt, USA	6
California State University, Northridge, USA	6
Institut d'Astrophysique et de Géophysique, Université de Liège, Belgium	5
Institute of Astronomy, National Central University, Chung, Taiwan	4
Instituto de Astronomía y Física del Espacio, Buenos Aires, Argentina	4
Lockheed Martin Solar and Astrophysical Laboratory, USA	3
Department of Astronomy, Stockholm University, AlbaNova University Center, Stockholm, Sweden	3
Dark Cosmology Centre, Niels Bohr Institute, University of Copenhagen, Denmark	3
Sterrenkundig Observatorium, Universiteit Gent, Krijgslaan, Belgium	3
Laboratoire d'Astrophysique de Marseille, Marseille, France	3

Table 14 shows the international research trend collaboration of Geology Department, DSB Campus, Kumaun University. The result reveals that only two international institutions, namely, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China and Ochang Center, Korea Basic Science Institute, Ochang, Chungbuk, Republic of Korea have collaborated with the department with an equal share of 1.

Table 14 Collaboration with International Institutions by Geology Department

Name of Institutions	Frequency
Institute of Geology and Geophysics, & Chinese Academy of Sciences, Beijing, China	1
Ochang Center, Korea Basic Science Institute, Ochang, Chungbuk, Republic of Korea	1
Institut de Physique du Globe de Paris (IPGP), France	1

Table 15 exhibits State Wise collaboration in Faculty of Science, DSB Campus, Kumaun University. Uttarakhand is the highest collaborative state with a percent share of 70.53 (577 times). New Delhi, Uttar Pradesh and Gujarat are comes second, third and fourth in collaborative state with a percent share of 12.59 (103 times), 4.28 (35 times) and 2.93 (24 times) respectively.

Table 15 State Wise Collaboration Trend

Name of State	Frequency	Percentage (%)
Uttarakhand	577	70.53
New Delhi	103	12.59
Uttar Pradesh	35	4.28
Gujarat	24	2.93
Maharashtra	10	1.22
Himachal Pradesh	9	1.10
Karnataka	9	1.10
Karnataka	9	1.10
Tamil Nadu	6	0.73
Telangana	4	0.49
Assam	4	0.49
Andhra Pradesh	4	0.49
Chhattisgarh	3	0.37
Kerala	2	0.24
Punjab	2	0.24
Manipur	2	0.24
Jammu & Kashmir	1	0.12
Madhya Pradesh	1	0.12
Rajasthan	1	0.12
Maharashtra	1	0.12
Assam	1	0.12
Total	818	100

Table 16 exhibits Country Wise collaboration in Faculty of Science, DSB Campus, Kumaun University. USA is the highest productive countries with percent share of 22.07 (32 times). France and Belgium are the second and third highest collaborative countries with a share percent of 17.24 (25 times) and 9.63 (13 times) respectively.

Table 16 Country Wise collaboration

Name of Country	Frequency	Percentage (%)
USA	32	22.07
France	25	17.24
Belgium	13	9.63
Germany	10	6.89
Canada	7	4.83
Japan	6	4.14
Denmark	5	3.45
United Kingdom	5	3.45
Argentina	4	2.76
Chile	4	2.76
Sweden	4	2.76

Name of Country (continued...)	Frequency	Percentage (%)
Taiwan	4	2.76
Poland	3	2.07
Portugal	3	2.07
Republic of Korea	3	2.07
Russia	3	2.07
Netherlands	2	1.38
Serbia	2	1.38
Spain	2	1.38
Australia	1	0.69
China	1	0.69
Czech Republic	1	0.69
Hungary	1	0.69
Italy	1	0.69
Malaysia	1	0.69
Nepal	1	0.69
South Africa	1	0.69
Total	145	100

Hypothesis: Collaborative Researches Dominates the Pattern of Publication

Table 17 Authorship Type Pattern

Authors	Year					Total Publications
	2010	2011	2012	2013	2014	
Single	7(11.86%)	4(5.97%)	3(4.62%)	1(1.35%)	2(3.64%)	17(5.31%)
Multiple	52(88.14%)	63(94.03%)	62(95.68%)	73(98.65%)	53(96.36%)	303(94.69%)
Total	59(100%)	67(100%)	65(100%)	74(100%)	55(100%)	320(100%)
$\chi^2 = 7.77$			$p = 0.56$			

In Table 17, Chi Square test was used to test the hypothesis whether collaborative research dominates the publication pattern across the span of the study which gave the following results ($\chi^2 = 7.77$, $p = 0.56$). Since the value was not significant we can conclude that the pattern of publication does not change during the span of the study and collaborative research dominates the pattern of publication with multiple author publications accounting for more than 90% of the total frequency of publication.

FINDINGS

The following findings are drawn from the study:

- The highest numbers of articles are published by three authors with a share percent of articles are 25% and multi authored papers are prevail during 2010 to 2014.

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- The average value of degree of collaboration is 0.95.
- L.M. Tewari, Professor of Botany has highest number of publications with a share of 50 papers and rank first.
- P.K. Goswami & R. Upadhyay, both Professors of Geology and P.K. Mishra, Assistant Professor of Physics rank first with Dominance Factor (DF) value 1.
- Each department faculty member's collaborate with in the department.
- Botany Department, DSB Campus, Kumaun University collaborate with the Swedish University of Agricultural Sciences, Uppsala, Sweden
- Chemistry Department, DSB Campus, Kumaun University collaborate with Chemistry Department California state polytechnic University Pomona Canada
- Physics Department, DSB Campus, Kumaun University collaborate with Observatoire de Paris, LESIA, Meudon Principal Cedex, France.
- Geology Department, DSB Campus, Kumaun University collaborate with Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China
- Faculty of Science, DSB Campus, Kumaun University has maximum collaboration within the Uttarakhand (70.53%).
- Country Wise collaboration in Faculty of Science, DSB Campus, Kumaun University has maximum collaboration with the USA (22.07%).
- Collaborative research dominates the pattern of publication with multiple author publications accounting for more than 90% of the total frequency of publication, which proves the hypothesis.

CONCLUSION

The study shows multi authorship pattern, which indicates that for the development of research in the field of science, there should be a dedicated team. The faculty members of this University should collaborate with others state of India and spread their research wings with international research team. Authorities should prepare a proper mechanism to develop the research activities in the campus. Internal Quality Assurance Cell (IQAC) of this University should take step to flourish the faculty members' research enthusiasm, so that total quality and quantity of publication output can enhance.

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