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Research Outcome On Higher Education India- A Bibliometric Study Of Scholarly Publications

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Abstract:

As of school education, higher education needs to be imparted equally to all by overcoming economic, social, regional, and geographical boundaries. not only ensuing the reach but also the quality in terms of developing and enhancing lifetime skills at global standards. It necessitates meticulous research and evolve a range of methods and protocols as standards to imply, check and ensure the quality of Higher education at different levels in various subject domains. In this line, a bibliometric analysis of international renown scholarly literature documented in the impact journals and resources has been carried out to reveal the trends that prevail in terms of Higher education Practices. Author collaboration multi country authors organizational contribution, source dynamics, citation impact were analysed on the research outcome of Higher education in terms of publication productivity. The paper also aimed at visualizing the research outcome using biblioshiny.

Keywords: Scientometric analysis, Higher Education, India, Author Productivity, Bibliographic Coupling.

Introduction:

Higher education is the third level of education after high school. It is typically conducted at universities and Further Education colleges and includes both undergraduate and postgraduate study. Higher education is tertiary education that leads to the award of a degree. Higher education, also known as post-secondary education, third-level education, or tertiary education, is an optional final stage of formal learning that occurs after secondary school. It corresponds to levels 6, 7, and 8 of the 2011 International Standard Classification of Education structure. Non-degree tertiary education is sometimes referred to as further education or continuing education, as opposed to higher education. A number of international human rights treaties mention the right to higher education. Article 13 of the 1966 United Nations International Covenant on Economic, Social, and Cultural Rights states that "higher education shall be made

equally accessible to all, on the basis of capacity, by any appropriate means, and in particular by the progressive introduction of free education." In Europe, all signatory parties are required to guarantee the right to education under Article 2 of the First Protocol to the European Convention on Human Rights, which was adopted in 1950. It is the responsibility of all stakeholders, particularly the national and international government organizations, consistently plan and work

0. Review of Literature:

A few of the related literature on assessing the higher education research publications using scientometric and bibliometrics techniques were reviewed and appended. As of the present study, the quantum of publications output, co-word and co citation analysis, year wise growth, highly cited researchers and authors, the applications of VOSViewer and so on have been analyzed.

Fauzi, M. A. (2022). The systematic review of knowledge hiding (KH) behaviour in higher education institutions was discussed (HEIs). Many scholars regard KH as unethical and antisocial behaviour that should not be tolerated in HEIs. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) model was used in a two-phase analysis that included quantitative scientometric analysis and a qualitative systematic literature review method. During the first phase, 1,174 articles were analysed with the VOSviewer using co-word and co-citation analyses. Phase 2 included a qualitative analysis of 20 related studies on KH in HEIs on the fundamental concept of KH. The main themes were chosen based on current research findings and the identification of relevant gaps in higher education. Co-word and co-citation analyses yielded six and three clusters, respectively, in Phase 1. Following that, five themes were identified in Phase 2: terminology of KH, scale of KH, cultural and geographical context, KH among academics and students, and relevant theories. There is also a discussion of the institutional factors of individuals, organisations, technology, and culture. This review provides a practical guide for HEIs to manage KH behaviour among academics, employees, and students.

Akbash, K. S., Pasichnyk, N. O., & Rizhniak, R. Y. (2021). to assess the impact of factors (university profile, year of establishment, number of research and teaching staff, population of the city in which the educational institution is located) on indicators of the publishing activity rating of Ukrainian university teachers (according to the Hirsch index, which determined by the indicators of the SciVerse Scopus database). This was accomplished through the use of one-way ANOVA and multiple regression models. As a result, the influence of all proposed factors was revealed, though the degree of influence for each was different. The article also determines the extent to which these factors influence the operational indicator of teachers' scientific activity - the number of citations in 2018-2019 of articles written in 2018 per one researcher or instructor. In this case, the same methods revealed the influence of only two variables: the university's profile and the number of research and teaching staff. Conclusions are drawn regarding the importance of developing university rankings based on operational (rather than cumulative) indicators of scientific activity, as well as the importance of taking into account the profile of educational institutions through the use of weighting factors.

Liu, N. C., Cheng, Y., & Liu, L. (2005). The Academic Ranking of World Universities, published on the web by the Institute of Higher Education at Shanghai Jiao Tong University, drew widespread attention worldwide. 60% of their criteria are based on scientometric databases. They were aware of all potential technical issues, went through "clean up" procedures, and made the necessary corrections. Highly cited researchers and articles published in Nature and Science were identified and attributed to the appropriate institutions one by one. They are confident that errors in their data, including human errors, are less than 2%. They will continue to rank, improve their ranking methodologies, and add more options to the ranking lists.

1. Objectives:

The main objective of this study is to analyze the publications output of Higher Education research in India reported during 1989-2022, which are indexed in the Web of Science database. In particular, the study aimed to:

- Find and list out the Annual Scientific Production on Higher Education Research in India
- To calculate the Source Impact and to evaluate the Source Growth on Higher Education Research in India
- Mapping of corresponding authors from various countries published on Higher Education Research.
- To find out institution wise distributions and country wise publication productivity of scholarly communications.
- Occurring of research terms in the publications are aimed at for analysis.
- Bibliographic Coupling and Co-Authorship by the prominent authors and Countries are being analyzed.

2. Methodology:

The present study is of descriptive method towards identify the prevailing status of research publications and also analytical in terms of applying statistical and scientometric indicators.,

In the current study, a bibliometric method, the study is based on research publications in the field of "Higher Education in India" that are indexed in the Web of Science database. The research data was obtained from the Web of Science Citation Database (https://apps.webofknowledge.com/) using the search query (TOPIC ("Higher Education") and (India) AND (LIMIT-TO (PUBYEAR, 1989-2022) retrieved on 17th August, 2022. The search strategy retrieved 3751 records, which were then analysed. For the analysis, all sorts of publications were chosen. The whole bibliographic data was obtained in Plaintext (*.txt) file format from the Web of Science database. The bibliometrix R package (Version 4.0.0, released on 15/06/2022) was initially installed and loaded using R Studio. The biblioshiny app was then launched by entering the first command (library (bibliometrics)) and then the second command biblioshiny () in the R console and then run the command. On the Biblioshiny interface, a Web of Science file in Plaintext format was submitted.

Then, in accordance with the goals of the study, VOSviewer, a programme for creating and visualizing bibliometric networks, and excel files were downloaded and utilized for data analysis.

An analysis based on citation, bibliographic coupling, co-citation, or co-authorship relationships has been made to create and display co-occurrence networks of significant terms taken from the body of scientific literature on Higher Education Research used for the study. The study was limited to the years 1989 to 2022.

3. Data Analysis and Interpretation:

3.1. Overall analysis of Publication Productivity on Higher Education Research in India

The data chosen for the study for 32 years from 1989-2022 both years of inclusive. It is found from the analysis that the sources in which the publication of higher education research of journals articles, book chapters, conference proceedings and other forms, which are accumulated to 1316. There 3751 publications were documented by the sources. Among the form of scholarly communication, the research articles are dominant with 3363 (89.66%) while review articles (160) and proceedings papers (52) are other forms of scholarly communications. There are 12493 authors published 3751 documents for the study period, of which, 449 authors were published single articles and remains as single articles. It reveals that author collaboration is of significant and dominant as 83 % of the publications by multiple authors. The citation profile of the collection could reveal that 19.47% as Average citations per document and the cited references are 121498.

Table 1: Overall analysis of Publication Productivity on Higher Education Research in India

S. No	DESCRIPTION	Results
1	Timespan	1989:2022
2	Sources (Journals, Books, etc)	1316
3	Documents	3751
4	Average years from publication	7.45
5	Average citations per documents	19.47
6	Average citations per year per doc	2.305
7	References	121498
	AUTHORS	
8	Authors	12493
9	Author Appearances	18909
10	Authors of single-authored documents	449
11	Authors of multi-authored documents	12044
	AUTHORS COLLABORATION	
12	Single-authored documents	517
13	Documents per Author	0.3
14	Authors per Document	3.33

3.2.Annual Total Citation per Year

The growth of citation as to the year wise productivity could reveal that the year 2002, 2019, 2020, 2018 are having the higher mean of total citations with 4.53, 4.37, 3.50 and 3.47 citations per year respectively, it also quit interesting to note that the recent publications of years 2017, 2018, 2019, 2020 and 2021 could get high mean citations though the citable years are between 1 to 5. The articles published in years could received lower mean citations with good number of publications (2013: 183; 2010: 126; 2016:224; 2015: 204). It is inferred that citation impact also depend on the quantum of publications. The analysis also reveals mean total citation per article; it is found that highest means total citation per articles is of 90.63 for the year 2002 and which has got 30 publications. which is followed by 2001, 2005 and 2006 having 70.23, 54.67 and 52.92 citations per article which is followed by the year 2004 with 48.02 citations per article for 42 publications and the year 1995 retrieved 48.41 citations per articles for 17, 42 articles.

Table 2: Annual Total Citation per Year

S. No	Year	NP	Mean TC per Art	Mean TC per Year	Citable Years
1	1989	2	0	0	33
2	1990	1	5	0.15	32
3	1993	19	11.68	0.40	29
4	1992	4	20.25	0.67	30
5	1991	7	26.28	0.84	31
6	1996	20	29.55	1.13	26
7	1997	20	28.55	1.14	25
8	2000	19	28.26	1.28	22
9	1994	9	39.77	1.42	28
10	1999	27	41.18	1.79	23
11	1995	17	48.41	1.79	27
12	1998	20	43.1	1.79	24
13	2010	126	26.75	2.22	12
14	2013	183	21.03	2.33	9
15	2007	75	37.37	2.49	15
16	2016	224	15.70	2.61	6
17	2004	42	48.02	2.66	18
18	2008	94	38.52	2.75	14
19	2009	101	36.17	2.78	13
20	2011	135	30.62	2.78	11
21	2014	180	22.69	2.83	8
22	2015	204	20.47	2.92	7
23	2012	180	29.26	2.92	10
24	2003	32	56.81	2.99	19
25	2017	219	15.29	3.05	5

26	2021	358	3.11	3.11	1
27	2005	55	54.67	3.21	17
28	2006	57	52.92	3.30	16
29	2001	26	70.23	3.34	21
30	2018	289	13.91	3.47	4
31	2020	353	7.00	3.50	2
32	2019	277	13.12	4.37	3
33	2002	30	90.63	4.53	20
34	2022	240	0.68		0

3.3. Source Impact

Source impact of the analysis could reveal that it correlated with the publication quantum of the journals as the top ten highly productive journals could find a place in top ten impact factor journals. PLOS One is the topmost impact source with h-index of 32, g-index of 50 and m-index of 2.13, it is followed by the Journal Social science and medicine with h-index of 25 g-index of 42 and m-index of 0.83. and BMC Public Health with h-index of 24 g-index of 39 and with the m-index of 1.41 higher than the Journal Social Science and Medicine. it is good to know that the journal from India, Indian Journal of Medical Research journal got place in 4rth rank with impact h-index of 19, g-index of 33 and with the m-index of 0.70.It is also found that journals having less number of publication of h-index, g- index has got higher m-index such the journals Cochrane Database of Systematic Reviews, International Journal of Environmental Research And Public Health, PLOS Medicine and BMC Health Services Research. The Broadford's law scattering of publications got defeated as the major sources are not contributing significance number of articles.

Table 3: Source Impact

S.No	Element	h_index	g_index	m_index	TC	NP	PY_start
1	PLOS One	32	50	2.13	3348	140	2008
2	Social Science & Medicine	25	42	0.83	2587	42	1993
3	BMC Public Health	24	39	1.41	1785	73	2006
4	Indian Journal of Medical Research	19	33	0.70	1168	41	1996
5	BMJ Open	18	27	1.63	799	38	2012
6	World Development	16	25	0.59	687	35	1996
7	National Medical Journal of India	15	22	0.55	535	30	1996
8	Asian Pacific Journal of Cancer Prevention	14	19	1	425	26	2009
9	Health Policy And Planning	12	16	0.48	648	16	1998
10	Journal of Health Population And Nutrition	12	19	0.57	441	19	2002
11	Bulletin of the World Health Organization	11	12	0.35	902	12	1992
12	Global Health Action	11	15	0.78	381	15	2009

13	BMC Health Services Research	10	17	0.83	307	19	2011
14	BMC Pregnancy And Childbirth	10	14	0.76	381	14	2010
15	International Journal of Epidemiology	10	11	0.37	667	11	1996
16	PLOS Medicine	10	14	0.90	562	14	2012
17	PLOS Neglected Tropical Diseases	10	17	0.83	661	17	2011
18	BMJ Global Health	9	14	1.5	220	14	2017
19	Cochrane Database of Systematic Reviews	9	14	0.81	591	14	2012
20	Higher Education	9	12	0.28	183	20	1991
21	International Journal of Educational Development	9	16	0.33	284	26	1996
22	International Journal of Environmental Research And Public Health	9	12	0.81	356	12	2012
23	International Journal of Tuberculosis And Lung Disease	9	12	0.36	321	12	1998
24	Journal of Biosocial Science	9	15		280	25	
25	Journal of Epidemiology And Community Health	9	10	0.33	440	10	1996

TC-Total Citation **NP- Number of Paper** **PY Start - Publication Year**

3.4.Author Impact

Most prolific authors have been listed out in the above table with their citations performance and reference pattern. It is found from the analysis that authors **Kumar, Amardeep** from National University of Educational Planning & Administration - India. **Kumar, Shailendra,** University of Delhi, India., **Srivastava, Shobhit**., from International Institute for Population Sciences., Mumbai, Maharashtra., and **Subramanian, Subu, V.,** from Harvard Center for Population and Development Studies, United States., were the highly contributed top three authors with 48, 42 and 38 publications with the Global Citation Score of 856, 620 and 224 respectively. The fourth ranked author Subramanian SV has got highest Global Citation Score as 1741 for 38 publications. As like any other subject, Higher Education Research also do have authors with less number of publications scored more number of citations like **Gupta, Rajesh H** from Visvesvaraya National Institute of Technology, Nagpur, **Singh, Ashish** from Indian Institute of Technology (IIT) - Bombay., **Reddy, K. Srinath** from Public Health Foundation of India., scored 1075, 744 and 1040 respectively for 36, and 21 publications.

Among the top 25 contributing authors Kumar, A., got 112.41 Average citations per year, next to Kumar, S., among the top 20 prolific authors 11 authors have got more than 20 citations per year. The analysis inferred that top 25 authors are contributing only 18.66 Percentage of total outcome for the study period. Hence the establish authors who were contributed more than 700 publication on higher education research in India.

Table 4: Author Impact

S.No	Author	Records	%	TLCS	TLCS/t	TLCSx	TGCS	TGCS/t	TLCR	TLCSb
1	Kumar A	48	1.3	20	1.38	19	856	112.41	34	1
2	Kumar S	42	1.1	19	2.1	11	620	76.94	23	5
3	Srivastava S	38	1	0	0	0	224	72.85	50	0
4	Subramanian SV	38	1	134	12.7	110	1741	189.1	64	26
5	Gupta R	36	1	55	4.92	42	1075	129.91	37	10
6	Singh A	36	1	29	6.11	19	744	140.01	55	3
7	Kumar P	35	0.9	6	1.39	4	186	45.88	34	1
8	Singh S	34	0.9	12	1.68	7	611	77.84	16	0
9	Prabhakaran D	33	0.9	36	3.28	18	989	124.02	41	7
10	Sharma S	31	0.8	24	2.16	18	643	80.31	15	2
11	Mohan V	28	0.7	18	2.17	10	647	77.06	23	7
12	Gupta A	26	0.7	8	1.12	8	446	47.45	8	1
13	Gupta S	26	0.7	5	0.55	3	514	61.66	16	0
14	Tandon N	24	0.6	10	1.35	3	462	66.07	26	6
15	Kumar R	23	0.6	19	1.69	18	656	69.62	9	2
16	Singh R	23	0.6	21	4.29	17	539	98.7	19	1
17	Sinha A	22	0.6	22	3	6	438	73.84	31	5
18	Das S	21	0.6	8	0.6	6	362	35.81	4	3
19	Jonas JB	21	0.6	25	2.01	2	581	58.43	28	11
20	Reddy KS	21	0.6	49	6.97	34	1040	168.84	31	5
21	Sharma A	20	0.5	11	2.15	11	452	43.89	8	2
22	Marmamula S	19	0.5	15	3.82	2	143	24.68	26	1
23	Singh K	19	0.5	7	0.76	4	289	38.12	16	5
24	Grover S	18	0.5	5	0.41	0	234	36.77	10	3
25	Patel V	18	0.5	40	3.2	25	998	93.46	20	7

TGCS/t- Total Global Citation Score per year TLCR- Total Local Cited References
TLCSx- Total Local Citation Score excluding self-citation TLCSb- Total Local Cited Score Beginning

3.5.Source Dynamics

It could reveal from the analysis that top highly productivity source journal**Indian Journal of Medical Research**started its publication in year 1996 and continuant till 2022 with gradual growth of publication from the total time span of twenty seven years.It is followed by the source **Current Science,** which started is recording from 1999 and till date with gradual growth of number of publication indexed. The highest productivity journal **PLOS One** in which the Indian research outcome on higher education is documented only from 2008 and continuing till 2022, other journal **BMC Public Health** has the same pattern of documenting the research

publication from the year 2006 to continue on 2022 with gradual growth. Hence, it is inferred the source dynamics for the top five articles are correlated with the productivity.

Table 5: Source Dynamics of Higher Education Research in India

S.No	Year	PLOS One	BMC Public Health	Current Science	BMJ Open	Indian Journal of Medical Research
1	1989	0	0	0	0	0
2	1990	0	0	0	0	0
3	1991	0	0	0	0	0
4	1992	0	0	0	0	0
5	1993	0	0	0	0	0
6	1994	0	0	0	0	0
7	1995	0	0	0	0	0
8	1996	0	0	0	0	2
9	1997	0	0	0	0	2
10	1998	0	0	0	0	2
11	1999	0	0	1	0	2
12	2000	0	0	2	0	3
13	2001	0	0	2	0	3
14	2002	0	0	2	0	5
15	2003	0	0	3	0	5
16	2004	0	0	5	0	6
17	2005	0	0	5	0	8
18	2006	0	1	5	0	12
19	2007	0	4	6	0	16
20	2008	1	5	9	0	17
21	2009	3	7	12	0	20
22	2010	5	8	14	0	22
23	2011	9	10	15	0	26
24	2012	17	15	17	3	29
25	2013	32	23	18	5	31
26	2014	46	29	22	6	32
27	2015	62	37	28	6	33
28	2016	70	41	32	13	36
29	2017	75	43	38	16	37
30	2018	95	49	42	21	38
31	2019	104	54	47	28	41
32	2020	120	62	52	34	41
33	2021	147	79	53	40	44
34	2022	152	95	54	53	44

3.6.Most Relevant Affiliations

Institution wise research productivity analysis found All India Institute of Medical Science, New Delhi from New Delhi has got highest contribution with 227(6.05%) followed by International Institute of Population Science from Mumbai, Maharashtra 164 (4.37%) and Postgraduate Institute of Medical Education and Research from Chandigarh 106 (2.83%) and Christian Medical College and Hospital from Vellore, Tamil Nadu with 98 (2.61%) of the top 20 institutions contributions there are 10 number of Indian institutions took place.

Table 6: Most Relevant Affiliations of Higher Education Research in India

S. No	Affiliations	Articles	%
1	All India Institute of Medical Science, New Delhi	227	6.05
2	International Institute of Population Science, Mumbai, Maharashtra	164	4.37
3	Postgraduate Institute of Medical Education and Research, Chandigarh	106	2.83
4	Christian Medical College and Hospital, Vellore, Tamil Nadu	98	2.61
5	London School of Hygiene & Tropical Medicine, England	91	2.43
6	Public Health Foundation of India, Haryana	90	2.40
7	Harvard University, United States	83	2.21
8	LV Prasad Eye Institute, Bhubaneswar	72	1.92
9	Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland	68	1.81
10	University of Melbourne, Melbourne, Australia	68	1.81
11	Indian Institute of Technology, Chennai, Tamil Nadu	64	1.71
12	Johns Hopkins University, Baltimore, USA	63	1.68
13	University of Toronto, Toronto, Canada	59	1.57
14	University of Oxford, United States	52	1.39
15	University of Washington, United States	51	1.36
16	Harvard T.H. Chan School of Public Health, Boston, Massachusetts	49	1.31
17	Jawaharlal Nehru University, New Delhi	48	1.28
18	National Institute of Mental Health And Neuroscience, Bengaluru, Karnataka	45	1.20
19	University of Michigan, USA	43	1.15
20	Columbia University, New York, United States	41	1.09

3.7.Most Cited Countries

Citation analysis of geographical relevance could find that India is in top position with total citations of 25948 (14.44%) Followed by USA with 18963 (28.14%) and followed by United Kingdom with 7223 (27.46%). The analysis inferred that the top five nation publication productivity correlated by citation impact.

Table 7: Most Cited Countries

S. No	Country	Total Citations	Average Article Citations
1	India	25948	14.44
2	USA	18963	28.14
3	United Kingdom	7223	27.46
4	Australia	2468	17.50
5	Canada	2118	22.29
6	China	1458	18.23
7	Switzerland	1175	45.19
8	Germany	915	24.08
9	Singapore	704	25.14
10	France	671	27.96
11	Spain	622	56.55
12	Belgium	447	49.67
13	Sweden	446	16.52
14	Pakistan	424	14.62
15	Italy	403	33.58
16	Netherlands	395	17.95
17	Israel	373	74.60
18	South Africa	351	15.95
19	Japan	348	15.82
20	Kenya	334	83.50
21	Uganda	320	53.33
22	Denmark	290	19.33
23	Bangladesh	274	10.96
24	Iran	273	24.82
25	Ethiopia	270	18.00

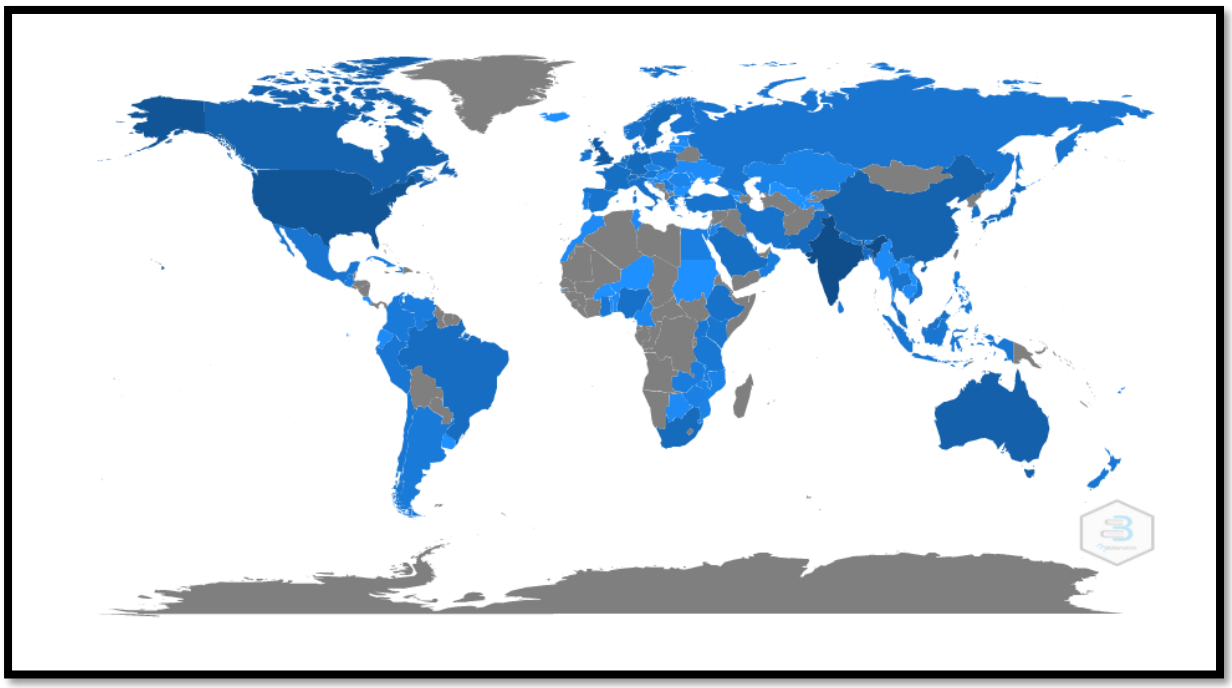

Figure 1: Country Scientific Production

5.11. VOS Viewer Visualisation on Higher Education Research in India

5.11.1. Bibliographic Coupling Organisations on Higher Education Research in India

The organisation map visualisation depicts the sources covered by 30 items divided into five groups, with organisations from clusters 1 through 10 appearing to research various types of organisations (Fig. 2). This number, which represents the weightage of All India Institute of Medical Science, can be found in the visualisation's left region. According to sources, the All India Institute of Medical Science has published the most articles on Higher Education Research in India. According to the visualization below, All India Institute of Medical Science in Cluster 2 has 29 linkages. International Institute of Population Science has 29 links, 1227 citations, and 9754 total link strength with 112 documents in cluster 1, followed by Publish Health Foundation India, which has 3330 citations, 19428 total link strength, and 105 documents.

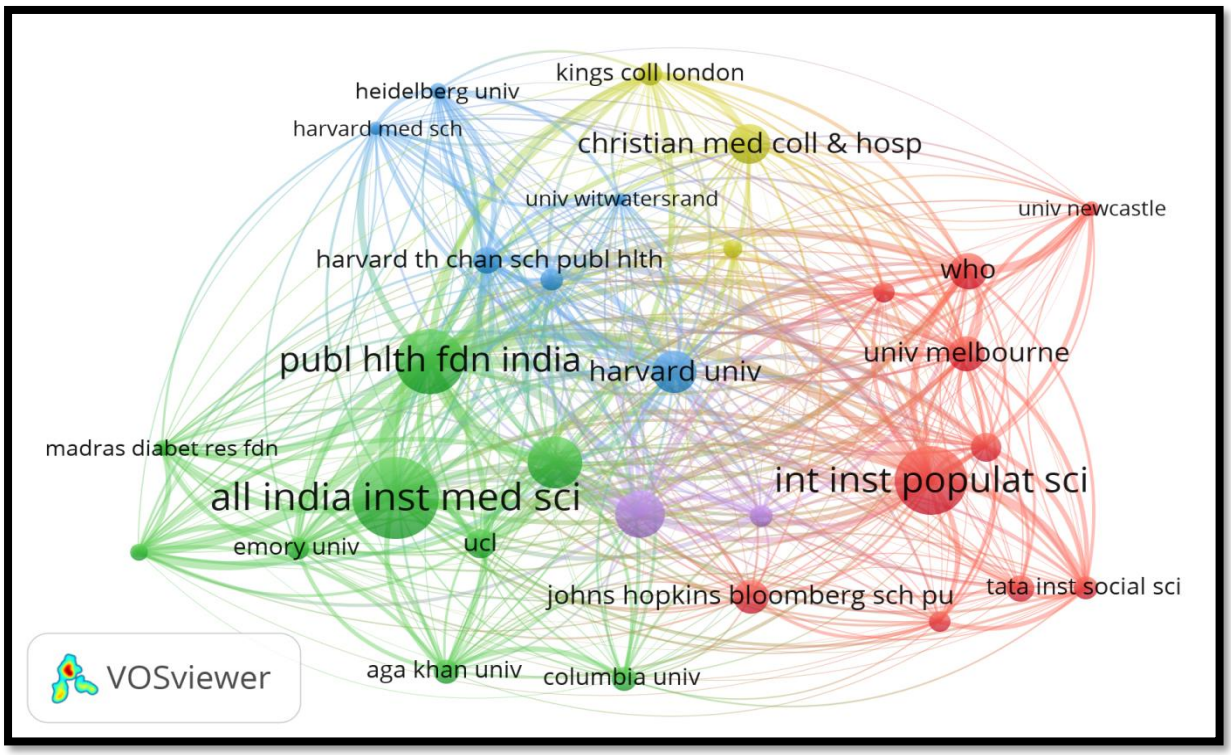

Figure 2: Bibliographic Coupling Organisations

5.11.2. Co Authorship Countries on Higher Education Research in India

Figure 3 depicts the co-authorship countries, which include India, the United States, England, Australia, the People's Republic of China, Canada, South Africa, and Switzerland. In India, Cluster 6 has 73 links, 1925 total link strength, 2442 documents, and 42393 citations, followed by USA Cluster 4, which has 70 links, 1382 total link strength, 1006 documents, and 27537 citations. In Cluster 6, England has 70 links, 862 total link strength, 495 documents, and 14653 citations, while Sri Lanka has 9 links, 18 total link strength, 13 documents, and 86 citations. Thailand is depicted in the visualisation as having 35 links, 106 total link strength, 30 documents, and 550 citations.

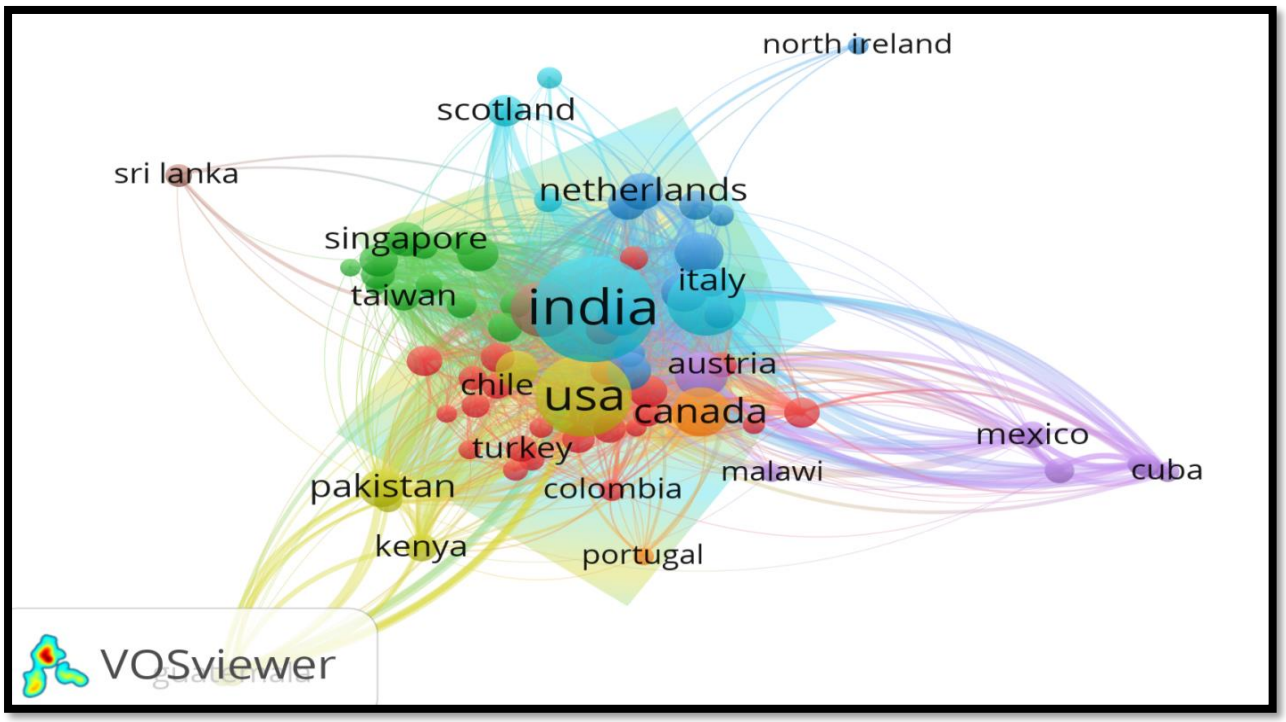

Figure 3: Co Authorship Countries

5.11.3. Co Occurrence – Keywords on Higher Education Research in India

The co-occurrence of various keywords, including India, prevalence, education, health, morality, women, risk factors, population, and determinates, is shown in Figure 4 Even though the title of the visualisation is "Higher Education Research in India," the analysis of the VOSviewer shows that the frequency of the keyword is According to higher education research; India had 1315 occurrences in cluster 3, 3037 total link strength, and 62 links. Cluster 1 had a prevalence of 397 links, 1189 total link strength, and 471 occurrences, and at least place was given to India. There are 56 links, 288 total link strengths, and 100 occurrences in countries in cluster 2.

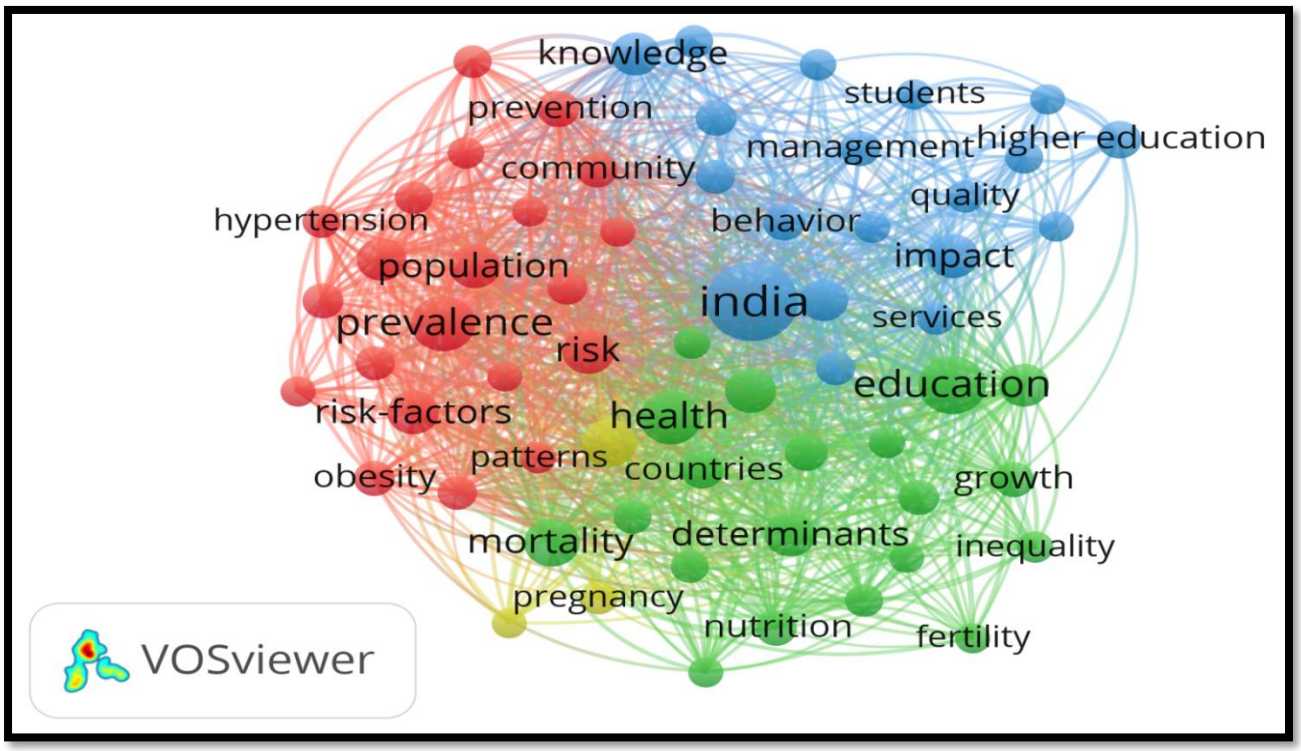

Figure 4: Co Occurrence – Keywords

4. Conclusion:

Scholarly literature growth indexed in impact sources could find significant growth during the last decade on the Higher Education Research in India. Collaborative research is of dominant while India is having highest single country author publication when compare to other nations author contributions. It is also found that India author's contributions have got highest citation while Kenya, Israel, Spain, Belgium and Switzerland have got higher average citation per article as 83.50, 74.60, 56.55, 49.67 and 45.19 respectively. The scholarly publication output on Higher education research proliferated into a large number of resources communicated by a large number of authors, it shows that prominent authors and sources are not correlated with Bradford's law of scattering and Lotka's law of author Productivity.

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