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Research Performance of Top Universities in Karnataka: Based on Scopus Citation Index

Kodandarama¹ and C.P. Ramasesh²

ABSTRACT:

[Paper furnishes the results of the analysis of citations of research papers covered by Scopus database of Elsevier, USA. The coverage of the database is complete; citations depicted by Scopus upto June 2019 are considered. Study projects the research performance of six well established top universities in the state of Karnataka with regard the number of research papers covered by scholarly journals and number of scholars who have cited these research papers. Also projected is the average citations per research paper and h-Index of authors. Paper also projects the performance of top faculty members who are involved in contributing research papers. Collaboration with authors of foreign countries in doing research work and publishing papers are also comprehended in the study, including the trends in publishing research papers which depict the decreasing and increasing trends of research work.]

INTRODUCTION:

Now-a-days, there is emphasis on improving the quality of research papers on the whole. In this direction, national academic and research bodies including assessment and accreditation agencies such as University Grants Commission, All India Council of Technical Education, Indian Council of Agricultural Research, Council of Scientific and Industrial Research, National Assessment and Accreditation Council and National Board of Accreditation do rely upon impact factor of journals and h-Index derived from citation indices to determine the quality of research publications. Impact factor and h-Index depicts the quality of papers based on the extent of use. Of late, there is focus on the prevention of plagiarism as well. The extent of originality of research papers is projected by the plagiarism check using anti-plagiarism software like as iThenticate and Turnitin . The anti-plagiarism software while scanning covers more than 65 billion pages web content. Moreover, the software scans within 10 minutes and shows how far the research paper submitted by the scholar is original. It also retrieves the sources from where the text contents are copied and finally enables to verify manuscript with already published research papers, side-by-side.

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In this present survey, attempt is made by the authors to project the research performance of top performing six universities in the state of Karnataka. The research papers covered by the Scopus citation index, up to June 2019 is considered. Further, attempt is made to project the collaborative research with the authors of foreign countries and the extent of use of papers based on citations.

In the present survey, h-Index is derived from Scopus Index. Scopus is the citation index, a product of M/s. Elsevier, USA. Scopus covers citations mainly from scholarly journals in the disciplines of science and technology. As of now, 22500 journals are covered by Scopus. Another popular citation index available to determine the h-Index is Web of Science. It is the product of Clarivate Analytics, USA. Grant giving organizations and assessment bodies usually rely upon either of these American citation indexes.

Here, *h*-index is an author-level metric that attempts to measure both the productivity and citation impact of the publications of a scientist or scholar. The index is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications. The *h*-index method of calculating the performance of authors was suggested in 2005 by Jorge E. Hirsch, an American Physicist. The calculation made and indicated as the *Hirsch index* or *Hirsch number*. The advantage of the *h*-index is that it combines productivity (i.e., number of papers produced) and impact (number of citations) in a single number.

When we say the h-Index of an author or organization is 30, which means, 30 of his papers have been used and cited by more than 30 authors while writing their papers. For each of these 30 papers, there will be minimum of 30 citing authors. Thus, the quality is determined based on the extent of use. Hirsch reckons that after 20 years of research, an *h*-index of 20 is good, 40 is outstanding, and 60 is truly exceptional.

Table 1 : Top performing universities in Karnataka State

Sl. No.	Universities	Place	Year of Establishment

01	University of Mysore	Mysuru	1916
02	Karnatak University	Dharwar	1950
03	Bangalore University	Bengaluru	1964
04	Mangalore University	Mangalore	1980
05	Gulbarga University	Kalaburgi	1980
06	Kuvempu University	Shimoga	1987

As of 2019, there are 27 universities in the state of Karnataka. Considering the year of establishment of state universities, the University of Mysore is the oldest of all which was established in the year 1916. Karnatak University, Dharwar is the second one which came into being in the year 1950 and Bangalore University was established in the year 1964. The three other universities shown in the above table were established during 1980s.

Table 2 : Use of research papers based on citations

Sl. No.	Universities	No. of Research Papers	No. of Times Cited	Average Citation per item	h-Index
01	University of Mysore	8007	63740	7.96	80
02	Karnatak University	4847	62277	12.84	91
03	Bangalore University	5562	59197	10.64	88
04	Mangalore University	4251	34422	8.09	67
05	Kuvempu University	2229	26743	11.99	62
06	Gulbarga University	2065	24681	11.95	63

The authors of Karnatak University though published 4847 papers, there are altogether 62277 citations depicting an h-Index of 91. The average citation per item stands at 12.84. Though the total publications of the University of Mysore depicted is 8007 papers, the total number of citations is 63740 with an h-Index of 80. Therefore, the University of Mysore is at the second place. Further, Bangalore University has contributed 5562 papers with average citation per item stands at 10.62. Gulbarga University though established in 1980, the h-Index is showing 63 as of June 2019.

Table 3 : Disciplines in which maximum number of papers published

Sl. No.	Universities	Subject Areas	No. of Papers
01	University of Mysore	1. Chemistry	2822
		2. Physics	1844
02	Karnatak University	1. Chemistry	1949
		2. Material Science	915
03	Bangalore University	1. Chemistry	1244
		2. Engineering	1049
04	Mangalore University	1. Physics	2084
		2. Astronomy, physics	1997
05	Gulbarga University	1. Engineering	501
		2. Astrophysics	472
06	Kuvempu University	1. Chemistry	799
		2. Pharmacology, Toxicology & Pharmaceuticals	415

As regards total number of papers contributed, University of Mysore is on the top with 8007 papers. However, considering the discipline-wise contribution, maximum number of papers are found in the discipline of chemistry from University of Mysore with 2822 papers, Karnatak University with 1949 papers in chemistry. Similarly, from Bangalore University and Kuvempu University, maximum number of papers are in the discipline of Chemistry with 1244 and 799 papers respectively. Further, 1844 and 2084 papers are depicted in the discipline of physics from University of Mysore and Mangalore University. Further, there are 1049 and 501 papers on Engineering subjects from Bangalore University and Gulbarga University respectively being the maximum number of papers contributed.

Table 4 : Increasing / Decreasing trend in publishing research papers in Karnataka

Sl. No.	Universities	2018	2017	2016	2015
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01	Mangalore University	304	206	198	189
02	Bangalore University	392	313	316	243
03	Karnatak University	269	210	219	237
04	Gulbarga University	101	74	108	79
05	Kuvempu University	171	188	138	119
06	University of Mysore	379	407	407	424

The data in the above table clearly depict that except in Mangalore University, Bangalore University and Karnatak University, there is decreasing trend as to the number of publications are considered in all the universities of the state. There is gradual increase in the number of papers contributed from Mangalore University. During 2015 there were only 189 papers and the number increased to 304 in 2018, depicting steady growth. The data also indicates that there is steady decrease in the number of papers contributed from the University of Mysore. The rest of the two universities also depicted the decreasing trend.

Table 5: Number of countries collaborated for publishing research papers

Sl. No	Universities	No. of Papers	No. of countries Collaborated	No. of collaborated Papers	Percentage of collaborated Papers
1	Univ of Mysore	8007	74	1920	23.40
2	Karnatak Univ	4847	98	859	17.72
3	Bangalore Univ	5562	74	828	14.87
4	Mangalore Univ	4551	78	1637	38.51
5	Kuvempu Univ	2229	49	426	19.11
6	Gulbarga Univ	2065	36	237	10.63

Table shows number of foreign countries collaborated in research work and also in contributing the research papers. Authors of the University of Mysore have collaborated with the authors of 74 foreign countries and the percentage of papers represent 23.40. Mangalore University authors have collaborated with 78 foreign countries and the number of papers is 1637 and the percentage of collaborated papers stands at 38.51, , being the highest among all the universities. Karnatak University

has collaborated with the authors of 98 foreign countries and the percentage of papers represent 17.72. Bangalore University authors have collaborated with the authors of 74 foreign countries and percentage of contributed papers represent 14.87. Gulbarga University and Kuvempu University have collaborated with 36 countries and 49 countries respectively and the percentage of contributed papers represent 10.63 and 19.11 respectively.

Table 6. Research performance of two popular universities in the country

Sl. No.	Universities	No. of Papers	No. of Citations	Average Citation per item	h-index
01	University of Hyderabad	12947	203953	15.75	140
04	JNU	12750	149173	11.69	128

Performance of well established two universities in the country is depicted in the above table. Considering the h-Index as the criterion, University of Hyderabad stands first with 140 h-Index. 12947 research papers have been cited 203953 times by authors across the world. This is considered as the best research performance in the country. The Jawaharlal Nehru University with 128 h-Index has been projected as the best performance.

Jawaharlal Nehru University is also among the top performers with an h-Index of 128. When the h-Index is said to be 128, which means 128 research papers have been cited by minimum of 128 authors across the world; for each of the 128 papers, there are minimum of 128 citing authors from various scholarly journals.

Table 7. Performance of Faculty based on number of papers and citations

Sl. No.	Universities	Faculty	No. of Papers	No. of Citations	Average Citation per item	h-index
01	Karnatak University	Aminabhavi TM	491	20910	42.58	71
		Nandibewoor ST	361	4282	11.86	31
02	Bangalore University	Venugopal KR	259	833	3.21	12
		Patnaik LM	188	724	3.85	12

03	Mangalore University	Gowda BT	559	2850	5.60	26
		Narayana B	707	3956	5.59	25
04	University of Mysore	Rangappa KS	414	5221	12.61	37
		Yathirajan HS	684	3227	4.71	23
05	Kuvempu University	Girisha BJ	152	1766	11.61	21
		Sherigara BS	146	2832	19.40	30
06	Gulbarga University	Mulimani VH	71	1130	15.91	20
		Umavathi JC	100	1055	10.55	18

The table depicts the best performance of the faculty members of six universities based on number papers and citations. Prof. Aminabhavi T.M. of Karnatak University, Dharwar has published 491 papers, with an h-Index of 71. For each of his papers, on an average there are 42.58 citations. From the same university, Prof. Nandibewoor S.T. has published 361 papers and his h-Index is 31. Next to this the best performance is of Prof. Rangappa K.S. from University of Mysore with 414 papers and an h-Index of 37. Prof. Sherigara from Kuvempu University has 146 papers and the h-Index is 30. Prof. Narayana B. of Mangalore University has contributed 707 papers with h-Index of 25 and Prof. Gowda B.T. has contributed 559 papers with an h-Index of 26.

Prof. Rangappa K.S and Prof. Yathirajn H.S.. have contributed 414 and 684 papers respectively. However, the performance of Prof. Rangappa happens to be the best from the University of Mysore as the h-Index is depicting 37.

Among the faculties of the six universities in Karnataka, the best notable performance is of Prof. Amina bhavi of Karnatak University, Prof. Rangappa of the University of Mysore and Prof. Sherigara B.S of Kuvempu University. Performance is based on number of papers contributed and further, the criterion of h-Index.

Table 8. Highly cited papers faculty in Karnataka

Sl. No.	Faculty	University	Name of the Journals	No. of times
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				cited
01	Aminabhavi T.M	Karnatak	Journal of controlled release, Vol.70 (1-2) 2001	2327
			Journal of controlled release, Vol.70 (1-2) 2004	1569
02	Byrappa K &	Mysore	Phytochemistry Reviews Vol. 5 (1) 2004	550
03	Kumar SG and Devi LG	Bangalore	Journal of Physical Chemistry A, Vol. 115 (46) 2011	1054
03	Patani GA & La Voie EJ	Mangalore	Chemical Reviews, Vol. 96 (8), 1996	790
04	Kavi Kishor PB et.al.	Gulbarga	Current Science, Vol. 88 (3) 2005	734
05	Girish K. & Kemparaju K	Kuvempu/Mysore	Nucleic Acids Research, Vol.37 (1), 2009	1954

The above table projects the research papers which are highly cited as per Scopus citation database. The paper of Prof. Aminabhavi T.M of Karnatak University has contributed a paper entitled “ Biodegradable polymeric nanoparticles as drug delivery devices” published in Journal of Controlled Release, Vol. 70 No. 1&2, 2001 has a total of 2327 citations.

The paper of Girish K. and Prof. Kemparaju K. of Kuvempu University have published a paper in Nucleic Acids Reviews Vol. 37 No.1, 2009 which has a total of 1954 citations. Further, Kavi Kishor and others have published paper in Current Science Vol.88 No. 3, 2005 has a total citation of 734. These are the authors having highest number of citations for their research papers.

FINDINGS AND CONCLUSION:

The number of papers being contributed by the faculties is gradually decreasing in four of the universities in Karnataka. It is mainly because of the fact that most of the senior professors in the universities of Karnataka have attained superannuation and the posts of professors are vacant since a long time. Even one hundred year old university (University of Mysore) and seventy year old (Bangalore

University) are facing inadequacy of teaching staff even to discharge effectively the routine functions of teaching and research. However, this trend is not so in case of some of the popular universities of the country such as JNU, University of Hyderabad and Osmania University. There is steady increase in the research contribution in these universities.

Impact factor of journals, h-Index of individual faculty and institution and percentage of similar content are the factors to be considered for quality performance in research. Considering the factor of h-Index, the performance of Karnatak University, Dharwar has to be appreciated as it is going beyond 91.

Except Mangalore University and Gulbarga University, a large percentage of the research contributions is from the discipline of chemistry. Most of the research papers contributed pertains to chemistry (Multidisciplinary).

Performance of faculties of all the universities of the state with regard to collaboration with the authors of foreign countries for research and publications is excellent. A good percentage of papers have been published in association with foreign authors (co-authorship).

The contributions of Prof. Aminabhavi of Karnatak University is excellent with an h-Index of 71 according to Scopus and 66 according to Web of Science. Further, his research papers have been cited by so many authors; two of his papers have been cited by 1569 and 2327 authors. For each of his 491 papers, on average there are 42.58 citing authors. This happens to be the best performance in the state of Karnataka

The grant giving organizations and quality performance assessment bodies do rely upon reports based on citation studies, especially those studies dependent on Web of Science and Scopus. Hence the importance of citation studies and bibliometric studies.

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