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Analytical Study of Citations of Research Articles of the University of Mysore Based on Scopus

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ABSTRACT

Paper furnishes the findings of the analytical study of the citations of the research articles contributed by the authors of the University of Mysore. Scopus Citation Index of Elsevier is the basis of the survey and coverage is from 1925 to 2021. Study furnishes the subject-wise- research performance and the department-wise contributions of research articles. Individual performance of top ten authors is highlighted. The performance authors has been depicted based on number of articles contributed, number of citations received, average citations per article and the h-index. Paper also depicts highly productive journals and collaboration with authors of foreign countries in publishing research work. Paper also depicts some of the highly cited research papers of the authors of the university of Mysore

KEYWORDS: ***Citation study, Research papers ; University of Mysore, Research Contributions*.**

INTRODUCTION

Research performance is being measured to assess the quality and to improve upon on continual basis. There is emphasis on improving the originality of research output, as well as, the quality of research papers on the whole. Performance accreditation agencies and the grant giving organizations do rely upon impact factor of journals and h-Index derived from citation indices to determine the quantity and quality of research publications. Impact factor of scholarly journals and h-Index of authors depict the quality of papers based on the extent of use. The extent of originality of research papers is projected by the plagiarism check services using anti-plagiarism software such as iThenticate and Turnitin. The anti-plagiarism software packages depict how far the research papers submitted by authors are original. It also retrieves the sources from where the text contents are copied and, finally enables to verify manuscript with already published research papers.

In the present study, an attempt is made to project the research performance of the well established University of Mysore which has completed 104 years of glorious service. The research papers and citations covered by the Scopus Citation Index from 1925 to January 10th , 2021 is considered for the present study. Further, attempt is made to project the extent of the use of research papers based on citations, as well as, the collaborative research work with the authors of foreign countries. Present study also projects the individual performance of some of the faculties of the university.

The performance based on the h-Index is derived from Scopus database which covers 39000 scholarly journals belonging to science, as well as, social sciences. Another popular citation index available to determine the h-Index is Web of Science. Web of Science is the product of Clarivate Analytics, USA which covers 33500 journals. Grant giving organizations and assessment bodies usually rely upon either of these American citation indices to assess the research performance of institutions and the extent of use of publications.

Further, *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*. Hirsch reckons that after 20 years of research, an h- index of 20 is good, 40 is outstanding, and 60 is truly exceptional.

Of late, institutions also prefer to rely upon I-10 criterion to determine the research performance. Here, it is calculated considering how many papers of a given author are cited by 10 and more than 10 authors. Occasionally, performance is determined based on G-Index as well.

Table 1:Performance of universities based on citations and h-index.

Sl. No.	Universities in Karnataka	No. of Articles contributed	No. of Citations Received	Average citations per item	h-Index
1	University of Mysore	8,631	79677	9.23	87
2	Bangalore University	5,306	61414	11.57	91
3	Karnatak University	5,254	75417	14.35	99
4	Rajiv Gandhi University of Health Sciences	4,847	34739	7.17	64
5	Mangalore University	4,819	42377	8.79	73
6	University of Agricultural Sciences, Bangalore	3,175	38762	12.21	81
7	Kuvempu University	2,599	35857	13.80	74
8	Gulbarga University	2,196	29983	13.65	70
9	Karnataka Veterinary, Animal and Fisheries Sciences University	2,170	16849	7.76	55
10	University of Agricultural Sciences, Dharwad	1,464	7273	4.97	39

11	Tumkur University	844	10241	12.13	48
12	Davanagere University	254	1481	5.83	19

University of Mysore has contributed 8631 research articles which in fact is the highest when compared to other universities in the state. Bangalore University and Karnatak University have contributed 5306 and 5254 research articles respectively. However, while referring to number of citations received, University of Mysore has received altogether 79677 citations with the average citation per paper depicting 9.23, which happens to be the best performance considering the extent of use of research publications. While referring to the performance based on h-index, Karnatak University with an h-index of 99 being the highest is in fact the best performance. Further, Bangalore University and University of Mysore are depicting the h-index of 91 and 87 respectively. The comparison of the performance of some of the universities in the state of Karnataka is furnished in the above table. The newly established universities have also shown good performance which is indicated by the citations and h-index. The research contributions and the performance based on citations of Mangalore University, Kuvempu University and Gulbarga University are worth highlighting at this juncture.

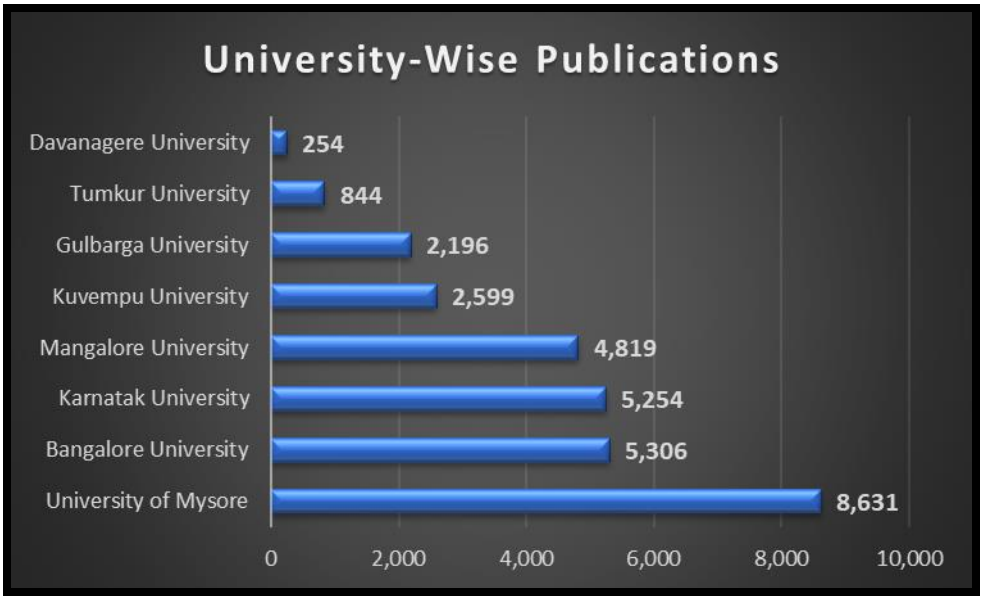
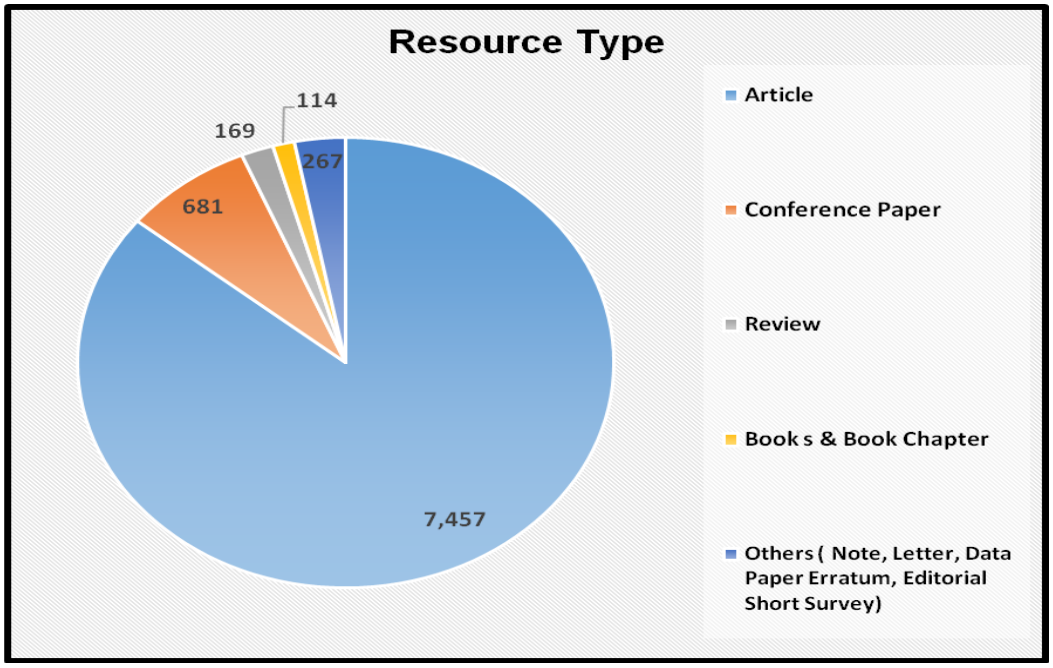


Table 2: Category-wise distribution of publications

Sl. No.	Category of publications	Number
1	Article	7,457
2	Conference Paper	681
3	Review	169
4	Books & Book Chapter	114
5	Others (Notes, Letters, Data Papers, Errata, Editorials, Short Surveys)	267



While referring to the category-wise distribution of publications of the University of Mysore, the Scopus Database depicts that 7457 are the reserch articles published in scholarly journals. Further, 681 are the articles published in the proceedings of conferences and seminars. Among the contributions, 169 are review articles and 114 are the books written by authors, including contributions as book chapters. There are 267 publications which include various other categories of publications such as editorials, notes, letters, short surveys etc. Journal articles are the major contributions from the authors of the University of Mysore, followed by the conference proceedings which is depicting 681 in number.

Table 3a : Number of papers collaborated with the authors of foreign countries

Sl. No.	Country	No. of article
1	United States	741
2	Germany	198
3	United Kingdom	188
4	Japan	128
5	Iran	120
6	Saudi Arabia	113
7	China	110
8	Malaysia	100
9	Singapore	78
10	Canada	70

Considerable number of authors of the University of Mysore have collaborated with the authors of foreign countries in the research work and contributed the research articles to scholarly journals. Altogether, 741 research articles have been published in collaboration with the authors of the United States of America. The data in the above table is depicting that 198 articles are with German coauthors and 188 articles have been published in collaboration with the authors of the United Kingdom. Further, there are 128 research articles in collaboration with the authors of Japan and 120 articles with the authors of Iran. Scopus Citation Index shows that the authors of the University of Mysore

have collaborated with the authors of 75 countries and the number of papers contributed in collaboration is showing 2677. This aspect of collaborative research has to be highlighted.

Table 3b: Articles contributed in collaboration with authors of foreign countries

Sl. No.	Universities in Karnataka	No. of Articles incollaboration with other counties	No. of Citations Received	Average citations per item
1	University of Mysore	2,126	25803	12.14
2	Mangalore University	1,712	12852	7.51
3	Karnatak University	969	19482	20.11
4	Bangalore University	797	15174	19.04
5	University of Agricultural Sciences, Bangalore	634	17069	26.92
6	Rajiv Gandhi University of Health Sciences	565	6661	11.79
7	Kuvempu University	407	10703	26.30
8	Gulbarga University	263	5693	21.65
9	Karnataka Veterinary, Animal and Fisheries Sciences University	253	4960	19.60
10	University of Agricultural Sciences, Dharwad	195	3524	18.07
11	Tumkur University	118	1222	10.36
12	Davanagere University	71	566	7.97

The University of Mysore in association with the authors of foreign countries have contributed 2126 research papers which is the highest when compared to the contribution of other universities. Further, the number of citations of the University of Mysore depicts 25803 with average citations per item is 12.14. Mangalore being the second, has contributed 1712 research papers. The performance of Karnatak University and Bangalore University is to be placed on records. However, the performance of University of Agricultural Sciences and RGUHS is to be considered for good performance.

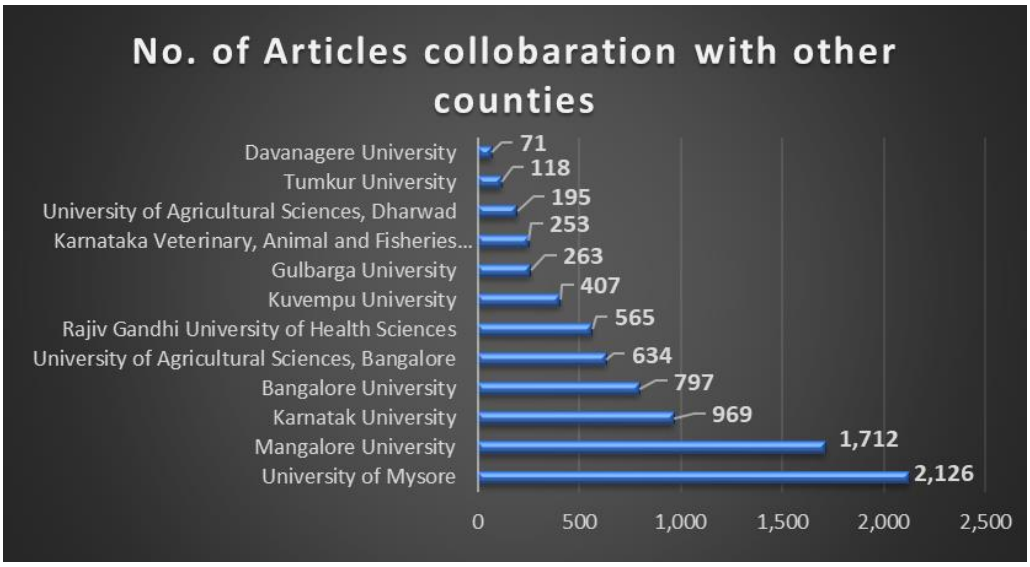


Table 4: Most productive journals of the University of Mysore

Sl. No.	Most productive journals	No. of articles published
1	Acta Crystallographica, Section E: Structure Reports Online	711
2	Molecular Crystals and Liquid Crystals	79
3	ActaCrystallographica, Section E: Crystallographic Communications	77
4	Journal of Molecular Structure	68
5	Asian Journal of Chemistry	63
6	Journal of Applied Polymer Science	63
7	Proceedings Of The Indian Academy Of Sciences, Section A	61
8	Archives of Phytopathology and Plant Protection	60

Table projects the titles of scholarly journals covered by Scopus which carry good number of research articles contributed by the authors of the University of Mysore. Among the journals, Acta Crystallographica, Section E: Structure Reports Online possesses 711 research articles of the University of Mysore which is the highest in terms of number of articles published. Further, 79 research articles are published in Molecular Crystals and Liquid Crystals and 77 articles are in Acta Crystallographica, Section E: Crystallographic Communications. The other most prominent journals that carry the articles of the University of Mysore are Journal of Molecular Structure, Journal of Applied Polymer Science and Archives of Phytopathology and Plant Protection.

Table 5: Discipline-wise contribution of research articles

Sl. No.	Subject-wise contribution of articles	No. of article
1	Chemistry	3,145
2	Physics	1,960
3	Materials Science	1,813
4	Biological Sciences (includes Biochemistry and Genetics)	2868
5	Pharmacology, Toxicology and Pharmaceutics	1,047
6	Computer Science	645
7	Medicine	578
8	Mathematics	523

While considering the discipline-wise contribution of research articles, there are 3145 research articles from the discipline of chemistry and 1960 articles are in the discipline of physics. It is also highlighting that there are 1813 research articles on the subject of material science which is also worth highlighting. From the discipline of biological sciences, there are altogether 2868 research articles which is also worth highlighting. Quite a number of articles are by the authors belonging to the department of biochemistry, botany and zoology. Specifically, there are 645 research articles in computer science, 578 articles in medicine and 523 articles in the discipline of mathematics. It is important here to highlight that in most of the state universities, large percentage of research articles contributed are from the disciplines of chemistry and allied disciplines.

Table 6: Performance of authors based on average citations and h-index

Sl. No.	Name of authors	No. of articles	h-index	No. of citations received	Average citation per item
1	Rangappa, K.S.	465	43	6736	14.48
2	Byrappa, K.	268	28	4993	18.63
3	Shetty, H.S.	165	30	2708	16.41
4	Yathirajan, H.S.	713	25	3714	5.20
5	Nagaraja P	128	22	1974	15.42
6	Lokanath, N.K.	317	21	1600	5.04
7	Basavaiah, K.	269	19	1966	7.30
8	Guru, D.S	175	18	1331	7.06
9	Sridhar, M.A.	215	15	1095	5.09
10	Prasad, J.S.	207	12	942	4.55

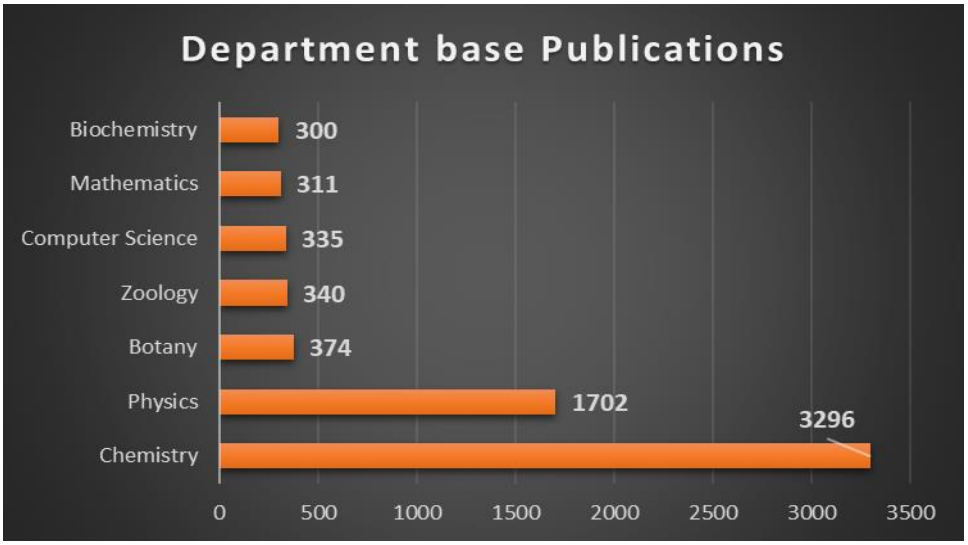
Individual performance of authors based on average citations per article and h-index is shown in the above table. Prof. K.S. Rangappa has contributed 465 research articles with an average citation 14.48 per paper and the h-index is 43 which is in fact is the highest among the authors of the University of Mysore. Further, Prof. K.Byrappa though contributed 268 research articles, the average citation per article depicted here is 18.63 and the h-index is 28 as per Scopus. Prof. H.S.Shetty has contributed 165 articles and his h-index is 30. The average citation per article stands at 16.41.

Prof. H.S.Yathirajan has contributed 713 research articles which in fact is the highest in terms of number of articles contributed. His h-index as per Scopus Index is 25. Regarding the performance of the authors from the Department of Chemistry, Prof. P.Nagaraja, Prof. N.K.Lokanath and Prof. K.Basavaiah are worth placing on records, especially considering the number of articles and number of citations received.

It is also highlighting fact that the contributions from the authors of the Department of Physics, Prof. J.S.Prasad and M.A.Sridhar are worth placing on records including the contributions by Prof. D.S.Guru from the Department of Computer Science. There are still many authors of the University of Mysore who have contributed significantly to the gamut of knowledge but, here the top ten authors are listed as indicated by Scopus Citation Index of Elsevier.

Table 7: Research performance of departments based on number of papers and citations

Sl. No.	Departments	No. of papers	No. of citations	h-Index	Average
1	Chemistry	3296	30000	59	9.10
2	Physics	1702	10572	37	6.21
3	Botany	374	3770	30	10.08
4	Zoology	340	2503	24	7.36
5	Computer Science	335	2288	23	6.82
6	Mathematics	311	1068	14	3.43
7	Biochemistry	300	5854	40	19.51



As regards department-wise contribution of research articles, as highlighted earlier in this paper, a large percentage is from the Department of Chemistry. Altogether 3296 articles are contributed by the authors of chemistry department with the total citations of 30000 and the average citation 9.10 per article. While referring to the contribution from the Department of Physics, there are 1702 research articles with a total number of 10572 citations. Next is from the Department of Botany, with a total contribution of 374 articles with a total citations of 3770. The h-index of chemistry department is depicting 59 which is the highest among all and 37 is the h-index of physics department and botany department indicating h-index of 30. Department of Biochemistry has contributed 300 research articles and they have been cited 5854 times and the average citation per article stands at 19.51. It is also highlighting that the h-index of the Department of Biochemistry is 40. However, the contributions of the other departments: Zoology, Computer Science and Mathematics are also worth highlighting here in the study.

Table 8: Top 10 highly cited papers of University of Mysore

Sl. No.	Title of articles	Authors	Sources	No. of Citations
1	Hydrothermal technology for nanotechnology	Byrappa, K., Adschiri, T.	Progress in Crystal Growth and Characterization of Materials, 53(2)2007: pp. 117-166	650
2	Intermolecular and supramolecular photoinduced electron transfer processes of fullerene-porphyrin/phthalocyanine systems	El-Khouly, M.E., Ito, O., Smith, P.M., D'Souza, F.	Journal of Photochemistry and Photobiology C: Photochemistry Reviews 5(1) 2007, pp. 79-104	505
3	Review: Polyaniline-A novel polymeric material	Syed, A.A., Dinesan, M.K.	Talanta 38(8)1991, pp. 815-837	437
4	The magic glue hyaluronan and its eraser hyaluronidase: A biological overview	Girish, K.S., Kemparaju, K.	Life Sciences 80(21)2007, pp. 1921-1943	389
5	Hydrothermal processing of materials: Past, present and future	Yoshimura,M., Byrappa, K.	Journal of Materials Science 43(7)2008, pp. 2085-2103	356

6	Nanoparticles synthesis using supercritical fluid technology - towards biomedical applications	Byrappa, K., Ohara, S., Adschiri, T.	Advanced Drug Delivery Reviews 60(3)2008, pp. 299-327	336
7	Antioxidant properties of various solvent extracts of mulberry (Morusindica L.) leaves	Arabshahi-Delouee, S., Urooj, A.	Food Chemistry 102(4)2007, pp. 1233-1240	303
8	Mycotoxins in Food and Feed: Present Status and Future Concerns	Bhat, R., Rai, R.V., Karim, A.A.	Comprehensive Reviews in Food Science and Food Safety 9(1)2010, pp. 57-81	290
9	The transformation of amphibolite facies gneiss to charnockite in southern Karnataka and northern Tamil Nadu, India	Janardhan, A.S., Newton, R.C., Hansen, E.C.	Contributions to Mineralogy and Petrology 79(2)1982, pp. 130-149	270
10	Preparation of magnesium-substituted hydroxyapatite powders by the mechanochemical-hydrothermal method	Suchanek, W.L., Byrappa, K., Shuk, P., (...), Janas, V.F., Tenhuisen, K.S.	Biomaterials 25(19)2004, pp. 4647-4657	268

Table depicts top ten highly cited research articles of the authors of the University of Mysore. Prof. K.Byrappa and Prof. T. Adschiri have contributed a paper to Progress in Crystal Growth and Characterization of Materials Vol.53 (2) 2007 which has been cited 650 times by the authors across the world which is in fact highly cited research article of the University. Further, Prof. K.Byrappa has contributed three more research articles which are also highly cited articles. The individual contributions in this regard have to be appreciated and placed on record.

The research articles contributed by Prof. D'Souza to the Journal of Photochemistry and Photobiology C: Photochemistry Reviews. Vol 51(1) 2007 has been cited 505 times in various journals which is in fact the second highly cited article of the University. Similarly, the research articles of Prof. Syed A Ahmad and Dinesan, Prof. K.Kemparaju and K.S.Girish have been frequently cited which are worth highlighting.

The research articles contributed by Prof. A.Urooj, Prof. R.V.Rai, R. Bhat have also been cited by good number of authors. Further, the article of Prof. A.S.Janardhan contributed to Contribution to Mineralogy and Petrology.Vol 79 (2) 1982 has been highly cited which is to be highlighted.

CONCLUSION

The refereed journals and their impact factor are considered widely to determine the quality of journal publications. Further, the h-Index of individual faculty and institution and the percentage of similar contents are the factors to be considered for quality performance in research. Considering the factor of h-Index and number of contributions, the University of Mysore, Karnatak University and Bangalore University have to be placed on record and appreciated for their good research performance. The universities which have been established during the past 40 years, especially Mangalore, Kuvempu and Gulbarga have also shown good performance in respect of number of citations, average citations per paper and h-index.

It is a well known fact that a large percentage of the research contributions are from the discipline of chemistry and allied subjects. Most of the research contributions pertain to chemistry (multidisciplinary). It is also the fact that a good number of research articles of the University of Mysore have been published in association with foreign authors (co-authorship). However, authors of the University of Mysore have collaborated with the authors of 75 foreign countries and, 741 research articles have been published in association with the authors of the United States of America.

As regards the highly productive journals of the University of Mysore, Acta Crysyallographica, Section E : Structure and Reports Online, is carries 711 research articles. Faculty from the Department of Chemistry have contributed a large number of research articles to this journal which is published from England. Out of the total research contributions, a large segment comprises of journal articles which is altogether 7457 in number.

While referring to the highly cited papers of the University of Mysore, Prof. K.Byrappa has contributed four research articles which are highly cited among the top ten research papers. The quality of the research articles is demonstrated here based on number of times cited. The highly cited research articles of other authors depicted in the table are also worth placing on record with appreciation.

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

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