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Research Article

Growth of Research Productivity of the University of Mysore: A Scientometric Study

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Abstract

The present study aims to identify the research productivity of University of Mysore during 1989 to 2018. The study also tried to retrieve the information regarding the total number of citations, h-index, average citation per article of the faculty members of University of Mysore using Web of Science. In order to get the research output of the university, the search terms 'University of Mysore' is entered in the search box of the "Web of Science". The result of the study shows that 4838 records of the University of Mysore have been included in the Web of Science database, out of which, majority 91.28% of the records are research articles. The study identified that among the faculty members of University of Mysore, Rangappa has received highest number of citations (4027), followed by Yathirajan has received 2425 citations. In this context, the study recommends that the faculty members of the both universities need to publish their research articles in peer reviewed journals with high Impact Factor.

Keywords: Research Productivity, Web of Science, University of Mysore

Introduction

Publication in high status refereed journals has become a major criterion of academic success in the competitive environment of global higher education. Universities are engaged in a global arms race of publication; and the academics are the shock troops of the struggle (Altbach, 2015)[1]. It is useful to keep in mind that the publications and rankings games are limited to a very small part of the academic system in any country.In recent years, there has been increasing interest among researchers and policy makers in the notion of research productivity. Research productivity is one of the major measures of university academic performance and a core indicator for calculations of university rankings. However, it is obvious that there exists the significance of cultural heritage for the styles of knowledge production by Asian academics as well. Higher education in Asia is approaching a historical moment, and recently, the average annual growth rates ofresearch publications have been particularly high in Asia (National Science Foundation, 2012)[2].

Research productivity is easier to measure than other kinds of academic work—teaching has been mentioned, and community engagement and such important functions as university-industry linkages are also difficult to define and quantify. Thus, research is not only the gold standard, but almost the only semi reliable variable. But even measuring research productivity is problematical (Altbach, 2015)[1].

The global rankings count journals that are indexed in main global indices—such as the Science Citation Index, Web of Science, or Scopus, or their equivalents for other disciplines. These indices list only a small number of journals and tend to favor publications in English, the global scientific language. The rankings and other national evaluations also count research grants and other awards. Again, this may be appropriate for the hard sciences, but not necessarily

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for other disciplines. The rankings also donot take into account the vast differences among countries and academic institutions. Neither the indices nor most universities recognize a range of other measures of productivity as well as significant changes in knowledge distribution that have taken place in recent years.

Thus, this study examined the research productivity of faculty members of the University of Mysore as reflected in the Web of Science. It also made an attempt to know the subject wise distribution of records, growth of records, ranking of authors based on the h-index and also total number of citations of faculty members as well as University of Mysore.

Review of Literature

In present years many studies have been conducted to know the growth of literature in various subjects using Scientometrics study. Bar-Ilan and Al (2007)[3] compared the rankings of the publications of highly-cited Israeli researchers induced by the citations counts reported by Web of Science, Scopus and Google Scholar. The computed measures show high similarity between Scopus and Web of Science and lower similarities between Google Scholar and the other tools, indicating that Google Scholar's coverage is considerably different from that of Web of Science and Scopus.

A study by Meho and Yang (2007)[4] used Web of Science, Scopus, and Google Scholar to locate citations to the publications of 25 LIS faculty members. They found less than 60% overlap between Web of Science and Scopus citations. The number of citations increased as they moved from Web of Science to Scopus (35.1% more citations), with most of the additional citations coming from conference proceedings. Adding Google Scholar citations to those from Web of Science-plus- Scopus identified 53% more citations, from more than 30 kinds of sources. The source(s) of citations used affected the relative rankings of faculty members as well. In the year 2008, Visser and Moed[5] compared the coverage of Web of Science and Scopus but on a paper-by-paper basis. They found that 89% of 1996 publications indexed by Web of Science are also indexed by Scopus, and for 2005 the percentage reaches 95%. Scopus has larger coverage than Web of Science for recent publications, but the additionally covered journals tend to have lower impact at least in oncology, as shown in (Lo´pez-Illescas et al. 2008)[6]. A study by Kulkarni et al., (2009)[7] compared the citation count profiles of articles published in general medical journals among the citation databases of Web of Science, Scopus, and Google Scholar. Google Scholar and Scopus retrieved more citations per article with a median of 160 than Web of Science. Compared with Web of Science, Scopus retrieved more citations from non–English-language sources and fewer citations from articles, editorials and letters.

Gupta and Bala (2010)[8] analyzed Indian Science and Technology publications of 1996-2010. This study conducted on the basis of Scopus database and examined several quantitative measures. The study found that India contributed 538609 papers in science and technology during 1996 to 2010 with an annual average growth rate of 9.32 per cent. The study found that top 100 most productive Indian organisations contributed 54.92 per cent share (295827 papers). The study shows that among the India's contribution to global research output in broad 20 subjects during 1996-2010, the largest publications share (5.49 per cent) comes from veterinary science. The study carried out by Bagalkoti (2013) on Scientometric analysis of Indian science publication output as reflected in Scopus Database found that 7,01,900 papers received 36,65,095 citations during the period 1997-2011.India was ranked 10th among the 50 productive countries of the world in Science and Technology. The study shows that global publications share of India during 1997-2011 was 2.73%, which has increased from 1.93 in 1997 to 4.00 in 2011 and India has published 1,59,110 (22.29%) international collaborative papers. As per the study Physical sciences subjects together contributed the highest publications share (57.59%), followed by Life Sciences (26.91%), and Medicine (15.51%). The study found that Indian Institute of Science contributed the highest publications, i.e., 26161 articles with 14.41% to total output and among universities, the largest number of papers 11685 (4.81%) is published by Jadavapur University, followed by Banaras Hindu University 11680 (4.80%).

Biswas and Akhtaruzzaman (2012)[9] have found that, a detail Scientometric analysis of medical research performance of Bangladesh and its comparison with other countries is very important to obtain a clear picture and to take necessary measures to upgrade our research performance. At the same time it is also very important to evaluate the research performance of major medical research institutes of the country and to compare their performance among themselves and similar institutes of other countries. According to Rasolabadi et al., (2015)[10], the aim of this study was to analyze Iran's research performance on diabetes in national and international context. This Scientometric analysis is based on the Iranian publication data in diabetes research retrieved from the Scopus citation database till the end of 2014. The study found that Iran's cumulative publication output in diabetes research consisted of 4425 papers from 1968 to 2014, with an average number of 96.2 papers per year and an annual average growth rate of 25.5 per cent. Iran ranked 25th place with 4425 papers among top 25 countries with a global share of 0.72 per

cent. Average of Iran's publication output was 6.19 citations per paper.

After reviewing the existing literature, it was found that there were various studies have been carried out to know the growth of publications by various subject, comparison the Google Scholar, Web of Science and Scopus. Henceforth, there were few studies conducted to measure the institutional productivity, thus the present study has been undertaken to measure the research productivity of University of Mysore.

Methodology

For the study, the literature was extracted from 'Web of Science' database for the period (1989–2018). To identify the literature, a keyword 'University of Mysore' was used to search and downloaded the records from the 'Web of Science', further the data has been analysed using MS Excel spread sheet.

Analysis and Interpretation of Data

Relative Growth Rate (RGR)

Relative Growth Rate (RGR) and Doubling time (D_t) has been applied, RGR means an increase in the number of articles per unit of time. The mean RGR of articles over the specific period of interval is represented as:

R_t = Relative Growth Rate of articles over the specific period of time.

$\log_e p(0)$ = Logarithm of initial number of articles

$\log_e p(t)$ = Logarithm of final number of articles

Similarly, RGR of subject's articles has increased in the number of articles per unit of time. The mean RGR of subject articles R_t(SA) over the period the specific period of time is determined as

$$R_t(SA) = \frac{1}{t}\left[\log_e p(t) - \log_e p(0)\right]$$

R_t (SA) = Relative Growth Rate of articles over the specific period of time.

$\log_e p(0)$ = Logarithm of initial number of articles

$\log_e p(t)$ = Logarithm of final number of articles

Doubling Time (D_t)

D_t (Doubling Time) has been calculated using the following formula:

Doubling Time or D_t = 0.693/R

D_t (Doubling Time) is directly related to RGR and is defined as the time required for the articles to become double of the existing amount. If the number of articles in subject doubles during a given period, then the difference between the logarithms of number at the beginning and at the end of this period must be the logarithm of the number 2. We used Napier logarithm and the token value of $\log_e 2$ is 0.693. Hence, an average growth rate has calculated, Napier logarithm has increased to 0.693. So the Doubling time is calculated as

$$D_t(SA) = D_t(SA) = \frac{\log_e 2}{R_t(SA)} = \frac{0.693}{R_t(SA)}$$

Here, D_t (SA) = average doubling time of subject articles.

Table 1.Relative Growth Rate (Rt) and Doubling time (D_t) of records of University of Mysore

Year	No. of records	Cumulative no. of records	$Log_e 1^P$	$Log_e 2^P$	$R_t(P)$	Mean $R_t(P)$	$D_t(P)$	Mean $D_t(P)$
1989	44	44	3.78		0.00		0.00	
1990	55	99	4.01	4.60	0.81		0.85	
1991	59	158	4.08	5.06	1.06		0.66	
1992	73	231	4.29	5.44	1.36		0.51	
1993	66	297	4.19	5.69	1.40	**0.93**	0.49	**0.50**
1994	54	351	3.99	5.86	1.67		0.41	
1995	55	406	4.01	6.01	2.02		0.34	
1996	45	451	3.81	6.11	2.10		0.33	
1997	94	545	4.54	6.30	2.49		0.28	
1998	69	614	4.23	6.42	1.88	**2.03**	0.37	**0.35**
1999	108	722	4.68	6.58	2.35		0.30	

2000	78	800	4.36	6.68	2.00		0.35	
2001	111	911	4.71	6.81	2.46		0.28	
2002	150	1061	5.01	6.97	2.26		0.31	
2003	111	1172	4.71	7.07	2.06	**2.22**	0.34	**0.31**
2004	158	1330	5.06	7.19	2.48		0.28	
2005	198	1528	5.29	7.33	2.27		0.31	
2006	262	1790	5.57	7.49	2.20		0.31	
2007	304	2094	5.72	7.65	2.08		0.33	
2008	201	2295	5.30	7.74	2.02	**2.02**	0.34	**0.32**
2009	264	2559	5.58	7.85	2.54		0.27	
2010	286	2845	5.66	7.95	2.38		0.29	
2011	301	3146	5.71	8.05	2.40		0.29	
2012	206	3352	5.33	8.12	2.41		0.29	
2013	216	3568	5.38	8.18	2.85	**2.52**	0.24	**0.28**
2014	238	3806	5.47	8.24	2.87		0.24	
2015	305	411	5.72	8.32	2.85		0.24	
2016	289	4400	5.67	8.39	2.67		0.26	
2017	269	4669	5.59	8.45	2.78	**2.79**	0.25	**0.25**

The table 1 indicates the Relative Growth Rate (Rt) and doubling time (Dt) of the records of University of Mysore. The table indicates that the RGR has been increased to from 0.81in the year 1990 to 2.78 in the year 2017.The highest mean relative growth rate is recorded between the year 2013-2017 is 2.79 and the least relative growth rate recorded between1989 to 1993 is 0.83, From the data presented in the table, it is found that there is positive correlation between the year and number of articles (r=.868, p=.000) and Correlation is significant at the 0.01 level.

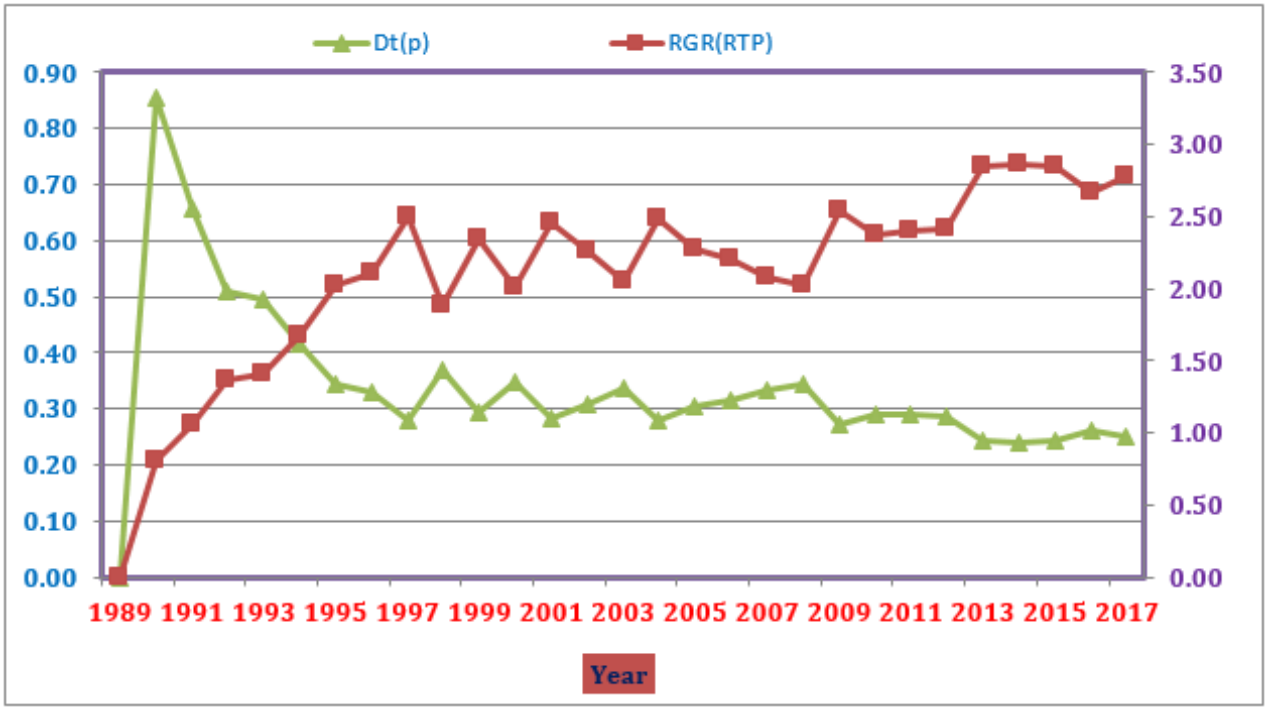

Figure 1.Growth rate of records of University of Mysore

Table 2.Type of Records included in Web of Science

Type of Records	Total	Percentage
Articles	4238	90.77
Proceedings Paper	102	2.18
Review	102	2.18
Meeting Abstract	66	1.41
Note	50	1.07
Editorial Material	30	0.64
Letter	24	0.51
Book Review	16	0.34
Correction	15	0.32
News Item	15	0.32
Biographical Item	3	0.06
Book Chapter	3	0.06
Retracted Publication	2	0.04
Correction addition	1	0.02
Discussion	1	0.02
Reprint	1	0.02
Total	**4669**	**100**

Table 2 represents the type of records included in the Web of Science database. It is observed from the table that the 90.77% of the articles are included in the Web of Science. It reflects that the authors have produced more number of research articles as compared with the other forms. Table also shows that only 2.18% of proceedings paper and reviews (2.18%) equally have included in the Web of Science database. It is observed from the table that only 0.02% of correction addition, Discussion and Reprint havecomprised in the Web of Science database.

Table 3.Research Productivity by subject (Top 10)

Subject	No. of records	Percentage	Rank
Crystallography	834	16.87	1
Chemistry multidisciplinary	571	11.55	2
Chemistry organic	307	6.21	3
Materials science multidisciplinary	297	6.01	4
Biochemistry molecular biology	280	5.66	5
Chemistry medicinal	250	5.66	6
Pharmacology pharmacy	250	5.06	7
Polymer science	211	4.27	8
Plant sciences	202	4.08	9
Food science technology	197	3.98	10

Top 10 subject wise research productivity shows in the table 3. It can be seen from the table that 16.87% of records by Electrochemistry subject are included in the Web of Science followed by Chemistry multidisciplinary (11.55%), Chemistry Organic (6.21%) and Materials science multidisciplinary (6.01%). The table also shows that only 3.98% of Food science technology subject's records have included in the Web of Science among top 10 subjects. It is identified that majority of records are included in the field of Crystallography and Chemistry. This shows that the faculty members of these departments have published their research work in Web of Science indexed journals.

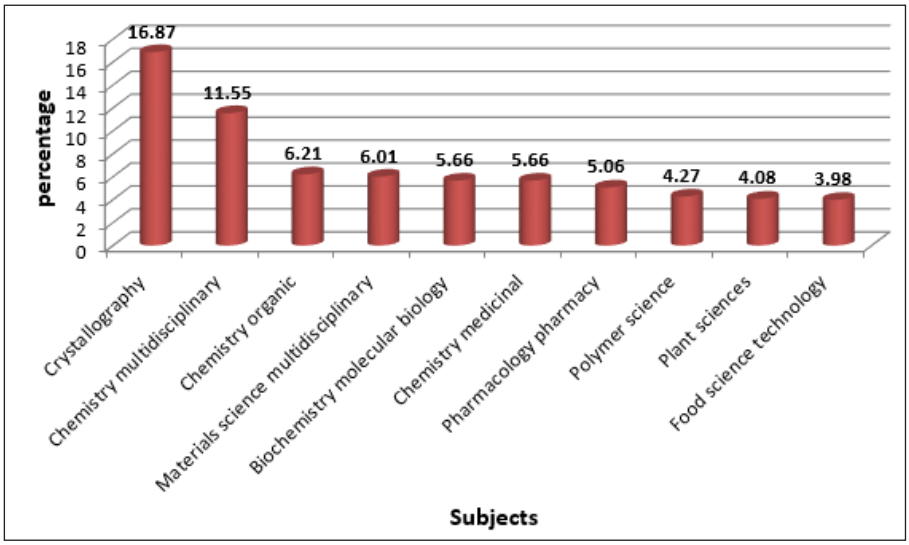

Figure 2.Research productivity by subject

Table 4.Ranking of authors based on the total number of Citation

	No. of articles	No. of citations	h-index	Average Citations	Rank
Rangappa K S	358	4027	30	10.97	1
Yathirajan H S	556	2425	19	4.36	2
Narayana B	345	1451	15	4.21	3
Prasad J S	194	1039	13	5.36	4
Basavaiah K	194	924	13	4.76	5
Sridhar M A	172	815	12	4.74	6
Somashekar R	142	762	13	5.37	7
Jasinski J P	180	485	9	2.69	8
Lokanath N K	138	478	11	3.46	9
Butcher R J	139	425	9	3.06	10

The study also tried to know the ranking of authors based on the total number of citations. The table-4 shows that, among the faculty members of the University of Mysore, Rangappa K. S. has highest citations (4027). The h-index (30) and average citations (10.97) are respectively and he secured rank 1. Table also shows that Yathirajan H. S.has 2425 citations and h-index and average citations are 19 and 4.6 respectively. Narayana B. is in the third place where he has 1451 citations, and his h-index and average citations are15 and 4.21 respectively.

Conclusion

The measurement of academic productivity is neither straightforward nor easy. The key function of teaching quality is seldom measured adequately in part because the assessment of teaching effectiveness is not easy and there are not widely accepted parameters. Less than a half-century ago, the bulk of the world's academic knowledge was communicated by a relatively small number of refereed journals that were widely recognized by the academic community. The result of the study indicates that the majority of the records of University of Mysore (90.77%) are articles. This indicates that faculty members of the university have been published greater part of research articles as compared to other forms of records indexed by the Web of Science. The study identified that among University of Mysore faculty members, Rangappa K. S. has received highest citations followed by Yathirajan H. S. It clearly shows that the faculty members of University of Mysore have published their research articles in highly reputed and indexed journals and they have done quality research. The result of the study found that majority of the records by Electro chemistry (16.87%) and Chemistry multidisciplinary (11.55%) subject articles have included in the Web of Science. This shows that the faculty members of these departments have published their research work in Web of Science indexed journals. In this context, the study recommends that the faculty members of the universities need to publish their research articles in highly reputed and peer reviewed journals.

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