Bibliometric analysis of Genetic Engineering research output through SCImago Journal & Country Rank

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Abstract - *This paper proposes an indicator of genetic engineering research output through SCImago Journals & Country Rank. The SJR indicator, for ranking scholarly journals based on genetic engineering citation weighting schemes and eigenvector centrality to be used Scopus database. Its computation methodology is described and the results after implementing the indicator over Scopus 2010 to 2014. The results showed that SJR indicator and Country rank distributions fitted well to a genetic engineering distribution and that both metrics were strongly correlated, although there were also major changes in rank. There was an observable general trend that might indicate that SJR indicator values decreased certain impact factor values whose citation was greater than would correspond to their scientific influence.*

Key Words: SJR, ranking list journals, journal impact factor, genetic engineering, country rank, citation.

1.INTRODUCTION

Bibliometrics is a type of research method used in Library and information sciences. It is an emerging area of research in the LIS field. The quantitative analysis and statistics to describe patterns of publication within a given field of body of literature are utilized. Researchers use bibliometric methods of evaluation to determine the influence of a single author or to describe the relationship between two or more author's works. Bibliometric studies can be used to study regional patterns of research, the extent of co-operation between research groups and national research profiles. The main derivatives of biblio- metrics are: publication counts, citation counts, co-citation analysis, co-word analysis, scientific 'mapping' and citations in patents. The word 'bibliometric' has been derived from the Latin and Greek words 'biblio' and 'metrics' which refer to the application of mathematics to the study of bibliography. Almind and Ingwersen, 1997 Bibliometrics refers to research methodology employed in library and information sciences, which utilizes quantitative analysis and statistics methods to describe distribution patterns of articles with a given topic.

2.ABOUT GENETIC ENGINEERING

Genetic engineering, also called genetic modification, is the direct manipulation of an organism's genome using biotechnology. It is therefore a set of technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms. New DNA may be inserted in the host genome by first isolating and copying the genetic material of interest using molecular cloning methods to generate a DNA sequence, or by synthesizing the DNA, and then inserting this construct into the host organism. Genes may be removed, or "knocked out", using a nuclease. Gene targeting is a different technique that uses homologous recombination to change an endogenous gene, and can be used to delete a gene, remove, add a gene, or introduce point mutations.

An organism that is generated through genetic engineering is considered to be a genetically modified organism (GMO). The first GMOs were bacteria generated in 1973 and GM mice in 1974. Insulin-producing bacteria were commercialized in 1982 and genetically modified food has been sold since 1994. Goldfish, the first GMO designed as a pet, was first sold in the United States December in 2003.

Genetic engineering techniques have been applied in numerous fields including research, agriculture, industrial biotechnology, and medicine. Enzymes used in laundry detergent and medicines such as insulin and human growth hormone are now manufactured in GM cells, experimental GM cell lines and GM animals such as mice or zebra fish are being used for research purposes, and genetically modified crops have been commercialized.

3.ABOUT SCIMAGO JOURNAL & COUNTRY RANK

The SCImago Journal & Country Rank is a portal that includes the journals and country scientific indicators developed from the information contained in the Scopus database by Elsevier. These indicators can be used to assess and analyze scientific domains.

This platform takes its name from the SCImago Journal Rank (SJR) indicator developed by SCImago from the widely known algorithm Google PageRank. This indicator shows the visibility of the journals contained in the Scopus database from 1996.

SCImago is a research group from the Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares, dedicated to information analysis, representation and retrieval by means of visualisation techniques.

As well as SJR Portal, SCImago has developed The Atlas of Science project, which proposes the creation of an information system whose major aim is to achieve a graphic representation of IberoAmerican Science Research. Such representation is conceived as a collection of interactive maps, allowing navigation functions throughout the semantic spaces formed by the maps.

4.LITERATURE REVIEW

2002 Lee made a scientometric study to find out research performance of the Institute of Molecular and Cell Biology (IMCB) of first ten years since its establishment. The findings shows that in the ten years, IMCB produced 395 research papers, 33 book chapters, 24 conference papers, and 4 monographs, graduated 46 PhDs, and filed 10 patents. In order to become world-class, IMCB researchers have been publishing in selected journals. It is found that 95.6% of the articles were published in ISI journals.

2002 Jeevan and Gupta studied research productivity of nine departments of IIT, Kharagpur by analyzing proportion of papers covered in SCI, Impact rate, Proportion of high quality papers and Publication Effectiveness Index (PEI). In addition to this other factors such as degree of collaboration among departments as well as international collaborations are also measured. On ranking departments on the basis of publication effectiveness index (PEI), it was found that only four departments have received the PEI value above one. They are in order of ranking of PEI values as: chemistry (2.221), Rubber Technology (1.446), Physics and Meteorology (1.289) and Electronics and Electrical Communication Engineering (1.098). It is also observed that those departments, which qualitatively perform better also tends to collaborate more, both at the national, as well at the international level

2002 Gupta, B.M. Aerospace science and technology is a major research area for nations because of its economic and strategic importance. A study done to find out the research publications in science and technology in India during the period 1995-1999. In India, the priority areas of research, as reflected in distribution of papers are chemistry, physics, biomedical research, clinical medicine, and engineering and technology. The publications output from 1986-88 to 1995-97 increased from 25.7% to 27.3% in chemistry, 16.2% to

20.2% in physics, and 10.8% to 11.1% in engineering &technology. The 26 co-authored papers in Engineering & Technology are scattered across 8 sub disciplines. The research was predominately bilateral in aerospace technology, metals & metallurgy, material science, computers and mechanical engineering and multilateral in civil engineering.

2011 Swain in his scientometric analysis of Library Philosophy and Practice from 2004 to 2009 found that the degree of collaboration in LPP ranged from 0.222 to 0.52 and the highest numbers of contributors hailed from Nigeria, followed by USA, India, and Iran. Hussain and Fatima (2011) in their study a bibliometric analysis of the Chinese Librarianship: an International Electronic Journal (2006-2010) found that USA is the most prolific country; highest paper cite the journal Interblending and Document Supply; the majority of papers were contributed by single authors.

5.OBJECTIVES

- ✓ To measure the research output of genetic engineering
- ✓ To identify the most ranking journals during the period
- ✓ To identify the ranking list of country
- ✓ To identify the journals which were most preferred by the researchers of the genetic engineering
- ✓ Measure the total citation, total documents, H index and Total References journals during the period under study

6.METHODOLOGY

One common method of bibliometric research is to trace publications using the SJR (*SCImago Journal Rank*) . The present study covers research publications of Genetic engineering during 2010 to 2014. It accesses the genetic engineering contribution and impact of research in different field of science and technology. The publication data of the university has been drawn from Scopus database. Scopus is published by Elsevier, USA; it is an online version of SJR. Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings. Delivering a comprehensive overview of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities, Scopus features smart tools to track, analyze and visualize research.

As research becomes increasingly global, interdisciplinary and collaborative, you can make sure that critical research from around the world is not missed when you choose Scopus. Finally 1506 research papers in different disciplines of science and technology retrieved matched with genetic engineering. Aspects referring to type of document, No. of Citation, documents, references, journal, country and h-index were analyzed with MS-Excel.

7.RESULT AND DISCUSSION

7.1.Genetic Engineering Published Manuscripts 2010-2014

Table 1 shows that journal articles were the most prominent form of the genetic engineering results 2010-2014. Majority of contributions had been done in the form of journal's articles with 309 publications 2013 (20.53%) followed by 2014 with 308 publications (20.47%) and 2012 with 306 publications (20.33%). It is also shown in Figure-1.

Table: 1 Year wise Distribution of Genetic Engineering H – Index

Year	No. of Articles	%	Cumulative %
2010	282	18.74	18.74
2011	300	19.93	38.67
2012	306	20.33	59.00
2013	309	20.53	79.53
2014	308	20.47	100.00
Total	**1505**	**100**	

One measure of genetic engineering research output which is becoming more commonly used is Hirsch's (h) index , which attempts to combine the quality and quantity of an individual's publication output into one measure. The h-index tells us that the number h of an author's publications have at least h citations; essentially it is a measure of the author's median citation rate and is therefore robust to the influence of a few highly cited paper. In Table 2 mention 431 Articles getting value of H Index 0-20 follow then 302 papers 21-40 finally follow more then 41 – 446 reaming articles getting H Index.

Table -2 Value of H Index

S.No	Value of H- Index	No. of Articles
1	0-20	431
2	21-40	302
3	41-59	203
4	60-80	204
5	81-100	130
6	101-118	65
7	121-138	60
8	143-446	110
	Total	**1505**

8.COUNTRY RANKING

Table 3 includes the ranking list of country that published the 1505 articles relating to genetic engineering during 2010-2014. The country is ranked in decreasing order of productivity.

Table 3 shows that country ranking published the largest number of articles in Europe 946 papers, 62.86% and is the first in the ranked order. The second rank in the order, respectively, are the United State of America published 449 (29.83%) and third rank 81 (5.38%) papers respectively Asian Countries.

Table 3 Country ranking

Rank	Country	No of Articles	%
1	Africa	9	0.60
2	Asia	81	5.38
3	Australia	5	0.33
4	Europe	946	62.86
5	Middle East	15	1.00
6	USA	449	29.83
	Total	**1505**	**100**

Journal title, Document, References and Citation about Genetic Engineering Research Productivity

320 journals which have carried research productivity about genetic engineering articles identified and the same is shown in Table 4. The Journal name mentions A to Z format. It will mention separate page for Appendix- 1 in this research paper

Table 4 Genetic Engineering Research Productivity

List of Journal Name (Appendix - 1)	Total No. of Document	Total No. of References	Total No. of Citation
A-G	87093	3636031	823733
H-Z	125009	5042173	1370250

9.GEOGRAPHICAL DISTRIBUTION OF GENETIC ENGINEERING

Table 5 includes the geographical distribution of genetic engineering. Form the analysis it has been observed that the highest numbers of contributors are from United States 419 articles and the percentage 27.84 % and it is followed by United Kingdom 27.44% Netherlands 13.09%, Ireland, India, Italy, China, Japan, New Zealand and Switzerland etc…

Table 5: Geographical Distribution of Genetic engineering

S.No	Geographical Details	No. of Articles	%	Cumulative %
1	Argentina	5	0.33	0.33
2	Australia	5	0.33	0.66
3	Brazil	10	0.66	1.33
4	Bulgaria	10	0.66	1.99
5	Canada	10	0.66	2.66
6	China	26	1.73	4.38
7	Czech Republic	10	0.66	5.05
8	Denmark	5	0.33	5.38
9	Egypt	5	0.33	5.71
10	Germany	139	9.24	14.95
11	Greece	15	1.00	15.94
12	Hungary	5	0.33	16.28
13	India	22	1.46	17.74
14	Iran	10	0.66	18.40
15	Ireland	15	1.00	19.40
16	Italy	22	1.46	20.86
17	Japan	28	1.86	22.72
18	Kenya	9	0.60	23.32
19	Macedonia	5	0.33	23.65
20	Mexico	5	0.33	23.98
21	Netherlands	197	13.09	37.07
22	New Zealand	35	2.33	39.40
23	Poland	5	0.33	39.73
24	Romania	5	0.33	40.06
25	Russian Federation	10	0.66	40.73
26	Singapore	5	0.33	41.06
27	Sweden	2	0.13	41.19
28	Switzerland	38	2.52	43.72
29	Turkey	10	0.66	44.38
30	Ukraine	5	0.33	44.72
31	United Kingdom	413	27.44	72.16
32	United States	419	27.84	100.00
	Total	**1505**	**100**	

10.CONCLUSIONS

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