Research Article

TIME SERIES ANALYSIS OF THE JOURNAL OF APPLIED AND ENVIRONMENTAL MICROBIOLOGY: A BIBLIOMETRIC STUDY

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ABSTRACT

The present study was discuss on the Applied and Environmental Microbiology (AEM). Applied and Environmental Microbiology is a biweekly peer-reviewed scientific journal published by the American Society for Microbiology. The present bibliometrics study was 15291 scholarly research articles published in 'Applied and Environmental Microbiology Journal, during the period 2001-2015. The collected data were analyzed with the help of 'Bibexcel tool'. The study also calculate the main tables on the basics of time series analysis. The study fully discussion on the future growth rate of all the years. Author wise and records are calculated on the most basic level. Finally the study having a good platform of the future growth level in both content.

INTRODUCTION

Bibliometric is the type of research method; it is an emerging area of research in the Library and Information Science field. The term "bibliometrics" is coined from two words "biblio" and "metrics". The word biblio is derived from the combination of a Latin and Greek word biblion-means a book or paper, metrics indicates the science of metre i.e. measurement.

Applied and Environmental Microbiology is a biweekly peer-reviewed scientific journal published by the American Society for Microbiology. It was established in 1953 as Applied Microbiology and obtained its current name in 1975. Articles older than six months are available free of cost from the website, however, the newly published articles within six months are available to subscribers only.

REVIEW OF LITERATURE

Thirumagal A (2013)[1] this study deals with the bibliometrics study on the publication of "Osteoarthritis" research. The records are collected from Pub Med resource MEDLINE for the period of 2001 to Osteoarthritis 2012. Total number of records for this study was 31,465. Osteoarthritis is a progressive disease, signs and symptoms slowly worsen over time. However, available treatment may help with pain and swelling (inflammation), as well as keeping the patient mobile and active. The collected data were analyzed with the help of 'Bibexcel tool'.

Rubinandhini A and Gomathi P (2015)[2] this study focuses on the journal from the Annals of Library and Information Studies. This study covers the total number of 324 articles studied only the one journal with five years (2005 to 2014). This paper discusses on authorship pattern, citation analysis, Publication Efficiency Index, length of articles, relative growth rate, Distribution of year wise citation analysis, degree of collaboration, country wise distribution of publications, and time series analysis of total authored papers also.

Santhakumar R and Kaliyaperumal K (2015)[3] this study focus on the growth and development of Mobile Technology research in terms of publication output as reflected in Web of Science database. During2000–2013 a total of 10,638 publications was published in the field. The average number of publications published per year was 759.86 and the highest numbers of publications 1495 were published in 2013. Output of total publications, 9037 was produced by multiple authors and 1601 by single authors. University of California System (USA) is the highly contributed institutions with 243 publications followed

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by University of London (UK) with 149 publications, Florida State University System (USA), National Chiao Tung University (China) with 88 publications.

Gomathi.P., & Rubinandhini. A. (2016)[4] this study evaluates the high blood pressure research output from the year 2011-2015. The data were downloaded from web of science database which was maintained by Thomson Reuters. Total number of records was 1152. The result of such studies may be very useful for the research administrators, policy makers and funding agencies. High blood pressure is a progressive disease, signs and symptoms slowly worsen over time. There is no change to do well. The collected data were analyzed with the help of 'Bibexcel tool'. The study also applied statistical tools such as Authorship pattern, Relative Growth Rate, Citation analysis.

Research Methodology and Limitation of the Study

The data for the study were retrieved from web of science database, which is a scientific and indexing service maintained by Thomson Reuters. The Applied and Environmental Microbiology Journal research output from the year 2001-2015. For this study bibliographic detail such as author, document type, collaboration, etc. was analyzed using bibexcel. Bibexcel is a software package used for bibliometric analysis and information visualization. The collected data were analyzed Microsoft Excel Sheet and presented in the form of tables.

Objectives of the Study

- To find out the yearwise distribution of articles.
- To examine the articles wise time series analysis.
- To calculate the single authored wise time series analysis.
- To determine the multiple authored wise time series analysis.
- To find out the overall authorship pattern of the time series analysis.

Data Analysis and Interpretation

Table 1 Year wise distribution of articles

Records	Number of Publications	Percentage
2001	847	5.5
2002	890	5.8
2003	1033	6.8
2004	1009	6.6
2005	1206	7.9
2006	1088	7.1
2007	1069	7.0
2008	1036	6.8
2009	1043	6.8
2010	1080	7.1
2011	1158	7.6
2012	1147	7.5
2013	981	6.4
2014	837	5.5
2015	867	5.7
Total	15291	100

Table 1 shows that year wise distribution of publications on the journal of Applied and Environmental Microbiology Journal research during the research period on 2001 to 2015 (15 years) a total of publications 15291 were published. The highest number of publications were 1206 (7.9%) in the 2005 and

values were scaled and being first position. The second highest number of publications 1158 (7.6%) in the year of 2011. The lowest publications is 837 (5.5%) articles in the year of 2014. However, there was a majority of the articles published in the year of 2011 were 1157 (7.6%) of records.

Table 2 Growth of Literature - Time Series Analysis

Year	Records	X	X^2	XY
2001	847	-7	49	-5929
2002	890	-6	36	-5340
2003	1033	-5	25	-5165
2004	1009	-4	16	-4036
2005	1206	-3	9	-3618
2006	1088	-2	4	-2176
2007	1069	-1	1	-1069
2008	1036	0	0	0
2009	1043	1	1	1043
2010	1081	2	4	2162
2011	1157	3	9	3471
2012	1147	4	16	4588
2013	981	5	25	4905
2014	837	6	36	5022
2015	867	7	49	6069
Total	**15291**		**280**	**73**

Straight line equation is applied to arrive at estimates for future growth under the Time Series Analysis.

Straight Line Y c= a+bX:

Since $\sum x = 0$

$a = \frac{\sum Y}{N} = \frac{15291}{15} = 1019.4$

$b = \frac{\sum Y}{\sum X^2} = \frac{73}{280} = 0.26$

Estimated literature in 2020 is when X = 2020 – 2008 = 12

= 1019.4+0.26X 12

= 1022.52

Estimated literature in 2025 is when X = 2025 – 2008 = 17

= 1019.4+0.26X 17

= 17338.64

The predicted value of literature output for the year 2020 is 1022.52 and the predicted literature output for the year 2025 in 17338.64.

On the application of formula of time series analysis and subsequently, from the results obtained separately from the results obtained for the years 2020 and 2025, it is found that the future trend of growth of research articles in Applied and Environmental Microbiology Journal research India output may take on increasing trend during the year to come. The inference from the calculations proved that the positive growth at the research literature output of Applied and Environmental Microbiology Journal research.

Table 3 Time Series Analysis of Single Authored articles

Year	Records	X	X^2	XY
2001	11	-7	49	77
2002	10	-6	36	60
2003	13	-5	25	65
2004	7	-4	16	28
2005	7	-3	9	21
2006	9	-2	4	18
2007	10	-1	1	10
2008	8	0	0	0
2009	6	1	1	6
2010	2	2	4	4
2011	8	3	9	24
2012	8	4	16	32
2013	5	5	25	25

2014	4	6	36	24
2015	5	7	49	35
Total	**113**		**280**	**129**

The straight line equation is applied to arrive at estimates for future growth under the time Series Analysis.

Straight Line Y c= a+bX:

$a = \frac{\sum Y}{N} = \frac{113}{15} = 7.53$

$b = \frac{\sum Y}{\sum X^2} = \frac{129}{280} = 0.46$

Estimated literature in 2020 is when X = 2020 – 2008 = 12

= 0.46+7.53x12

= 89.9

Estimated literature in 2025 is when X = 2025 – 2008 = 17

= 0.46+7.53x17

= 127.55

From the results of the Time Series, it is found that the trend of Applied and Environmental Microbiology Journal research output by Single authors' shows up an increasing trend and estimated in the year 2020 and the same trend may also be expected in 2025. Hence the inference is that the rate of growth is positive in single authored publications of articles in the journal research. Hence, the trend of single authorship according to the Time series analysis will be registered as 89.9 growth in 2020; while in the 2025, the growth will be expected as more than 127.5 contributions by single authorship.

Table 4 Time Series Analysis of Multi- Authored articles

Year	Records	X	X²	XY
2001	836	-7	49	5852
2002	880	-6	36	5280
2003	1020	-5	25	5100
2004	1002	-4	16	4008
2005	1199	-3	9	3597
2006	1079	-2	4	2158
2007	1059	-1	1	1059
2008	1028	0	0	0
2009	1037	1	1	1037
2010	1078	2	4	2156
2011	1150	3	9	3450
2012	1139	4	16	4556
2013	976	5	25	4880
2014	833	6	36	4998
2015	862	7	49	6034
Total	**15178**		**280**	**57**

The straight line equation is applied to arrive at estimates for future growth under the time Series Analysis.

Straight Line Y c= a+bX:

$a = \frac{\sum Y}{N} = \frac{15178}{15} = 1011.87$

$b = \frac{\sum Y}{\sum X^2} = \frac{57}{280} = 0.20$

Estimated literature in 2020 is when X = 2020 – 2008 = 12

= 0.20+1011.87x12

= 12142.64

Estimated literature in 2025 is when X = 2025 – 2008 = 17

= 0.20+1011.87x17

= 17201.99

From the results of the Time Series, it is found that the trend of Applied and Environmental Microbiology Journal research output by Multi authors' shows up an increasing trend and estimated in the year 2020 and the same trend may also be expected in 2025. Hence the inference is that the rate of growth is positive in multi authored publications of articles in the journal research. Hence, the trend of multi authorship according to the Time series analysis will be registered as 12142.64 growth in 2020; while in the 2025, the growth will be expected as more than 17201.99 contributions by multi authorship.

Table 5 Time Series Analysis in total number of authorship productivity

Year	No. of Publications	X	X²	XY
2001	3689	-7	49	25823
2002	4069	-6	36	24414
2003	4659	-5	25	23295
2004	4812	-4	16	19248
2005	5827	-3	9	17481
2006	5544	-2	4	11088
2007	5509	-1	1	5509
2008	5408	0	0	0
2009	5465	1	1	5465
2010	5899	2	4	11798
2011	6468	3	9	19404
2012	6386	4	16	25544
2013	5634	5	25	28170
2014	4933	6	36	29598
2015	5318	7	49	37226
Total	**79620**		**280**	**30347**

The straight line equation is applied to arrive at estimates for future growth under the time Series Analysis.

Straight Line Y c= a+bX:

$a = \frac{\sum Y}{N} = \frac{796\ 20}{15} = 5308$

$b = \frac{\sum Y}{\sum X^2} = \frac{3034\ 7}{280} = 108.38$

Estimated literature in 2020 is when X = 2020 – 2008 = 12

= 108.38+5308x12

= 63804.38

Estimated literature in 2025 is when X = 2025 – 2008 = 17

= 108.38+5308x17

= 90344.38

From the results of the Time Series, it is found that the trend of Applied and Environmental Microbiology Journal research output by authorship productivity shows up an increasing trend and estimated in the year 2020 and the same trend may also be expected in 2025. Hence the inference is that the rate of growth is positive in authorship productivity publications of articles in the journal research. Hence, the trend of authorship productivity according to the Time series analysis will be registered as 63804.38 growth in 2020; while in the 2025, the growth will be expected as more than 90344.38 contributions by authorship productivity.

FINDINGS AND CONCLUSION

- The study was finalized the highest number of publications were 1206 (7.9%) in the 2005 and values were scaled and being first position.
- The predicted value of literature output for the year 2020 is 1022.52 and the predicted literature output for the year 2025 in 17338.64.
- The study was covred trend of single authorship according to the Time series analysis will be registered as 89.9 growth in 2020; while in the 2025, the growth will be expected as more than 127.5 contributions by single authorship.

- To examine the trend of multi authorship according to the Time series analysis will be registered as 12142.64 growth in 2020; while in the 2025, the growth will be expected as more than 17201.99 contributions by multi authorship.
- The evaluation of authorship productivity according to the Time series analysis will be registered as 63804.38 growth in 2020; while in the 2025, the growth will be expected as more than 90344.38 contributions by authorship productivity.

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