

AUTHORSHIP PRODUCTIVITY ON APPLIED AND ENVIRONMENTAL MICROBIOLOGY JOURNAL OUTPUT DURING 2006-2010: A BIBLIOMETRIC STUDY

Mrs. A. Rubinandhini,
Research Scholar,
DLISc, Periyar University,
Salem – 636 011.
Email ID: jarubi22@gmail.com

Dr. P. Gomathi,
Assistant Professor,
DLISc, Periyar University,
Salem – 636 011. Tamilnadu.
Email ID: gomathi148@gmail.com

ABSTRACT

This paper analyses publication and authorship patterns in the Journal of Applied and Environmental Microbiology an open access journal from 2006-2010. Authorship pattern Productivity is one of the important aspects in the Bibliometric analysis. Applied and Environmental Microbiology is a biweekly peer-reviewed scientific journal published by the American Society for Microbiology. This type of research method is an emerging area of research in the library and information field with a sample of 5316 articles collect from Applied and Environmental Microbiology Journal during 2006-2010. This study covers to the total number of five years (2006-2010). The collected data were analyzed with the help of 'Bibexcel tool' and Hist cite. The references were collected from Mendeley and Endnote Software. This paper discusses on Year wise, authorship pattern, Degree of Collaboration, Time serious analysis in multiple authors, Collaborative Index also. This study provides the insights and development of the journal towards excellence.

Keywords: Bibliometrics, Authors wise distribution, Degree of Collaboration, Collaborative Index, And Prolific Authors.

1. 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 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

The journal's scope includes "(a) applied microbiology, including biotechnology, protein engineering, bioremediation, and food microbiology, (b) microbial ecology, including environmental, organismic,

"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.

six months are available to subscribers only. According to the Journal Citation Reports, the journal has a 2014 impact factor of 3.668. The journal has been ranked as one of the top 100 journals over the past 100 years in the fields of biology and medicine. The current editor-in-chief is Harold L. Drake (University of Bayreuth).

and genomic microbiology, and (c) interdisciplinary microbiology, including invertebrate microbiology, plant microbiology, aquatic microbiology, and geomicrobiology".

2. REVIEW OF LITERATURE

Thanuskodi (2010)¹ in her analysis aimed at analyzing the research output performance of social scientists on social science subjects. The analysis covered mainly the number of articles, authorship

Srinivasa Ragavan, Surulinathi and Neelakandan (2012)² Depict the scientometric parameters for medical plant research during the period 1973-2009, a total of 1265 publications were published at

Gomathi P (2014)³ the present study is to analyze the SERLS journals of information management (2013) a Bibliometrics study. The bibliometrics is a set of methods to quantitatively analyze academic literature; citation analysis and content analysis are commonly used

Rubinandhini A and Gomathi P (2015)⁴ 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,

pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc.

the national level. This paper discusses on authorship pattern, institution wise, subject wise, length of articles, number of keywords used and country wise publications.

bibliometrics methods. Although bibliometrics methods are most often used in the field of Library and Information Science. This paper discusses on authorship pattern, institution wise, subject wise, length of articles, number of keywords used and country wise publications.

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.

3. OBJECTIVE OF THE STUDY

- i. To find out the year wise distribution of articles, authorship pattern
- ii. To Study of the Single Vs Multiple, degree of Collaboration
- iii. To Study of the year wise authorship pattern
- iv. To find out the Relative Growth rate and Doubling time for research output
- v. To examine the Collaborative Index
- vi. To calculate the time serious analysis and prolific authors.

4. RESEARCH METHODOLOGY

The Methodology followed for this study consists of studying in the nature and the research productivity on Applied and Environmental Microbiology Journal (2006 to 2010) in the field of Microbiology

Science. Five years have been taken into a spreadsheet. The collect data from web of science have been analyzed with the Bibexcel software, Microsoft Excel sheet and presented in the form of tables.

5. SCOPE AND LIMITATION OF THE STUDY

The present study is based on over all 5316 articles appended in Applied and

Environmental Microbiology Journal 5 years i.e. 2006 to 2010.

6. ANALYSIS AND RESULTS

According to the objective of the study, analysis and findings of the study are outline below.

Table – 1: Year wise distribution of articles

S. No	Publication Year	Records	%
1	2006	1088	20.5
2	2007	1069	20.1
3	2008	1036	19.5
4	2009	1043	19.6
5	2010	1080	20.3
Total		5316	100

Figure – 1.1: Year wise distribution of articles

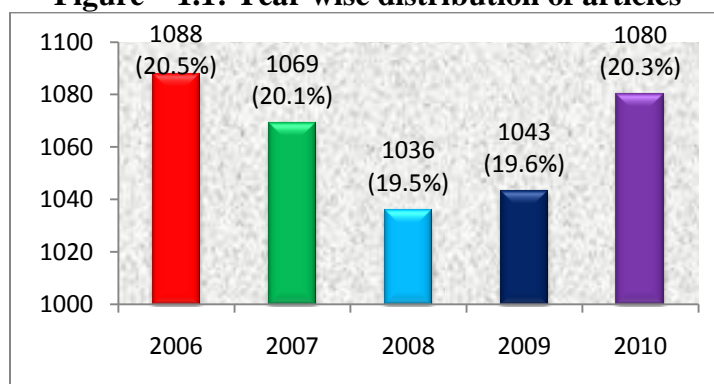


Table 1 and figure 1 show that year wise distribution of publications of Applied and Environmental Microbiology Journal research output in the year of 2006 to 2010 (5 years) a total of publications were 5316 published. The highest number of

publications 1088 (20.5%) and the lowest number of publication were 1036 (19.5%) in the year 2008. The study reveals that the majority of the articles published in the year of 2006 a total of publications were 1088 (20.5%).

Table- 2: Time serious analysis on AEMJ Research

Year	No. of Publications	X	X ²	Xy
2006	1088	-2	4	-2176
2007	1069	-1	1	-1069
2008	1036	0	0	0
2009	1043	1	1	1043
2010	1080	2	4	2160
Total	5316		10	42

The straight line equation is applied to arrive at estimates for future growth under the time Series Analysis.
Straight Line $Y = a + bX$:

Since $\sum x = 0$

$$a = \frac{\sum Y}{N} = \frac{5316}{5} = 1063.2$$

$$b = \frac{\sum Y}{\sum X^2} = \frac{42}{10} = 4.2$$

Estimated literature in 2020 is when $X = 2020 - 2008 = 12$

$$= 1063.2 + 4.2 \times 12$$

$$= \mathbf{12808.8}$$

Estimated literature in 2025 is when $X = 2025 - 2008 = 17$

$$= 1063.2 + 4.2 \times 17$$

$$= \mathbf{18145.8}$$

From the results of the Time Series, it is found that the trend of Applied and Environmental Microbiology research output by publication shows up an

increasing trend and estimated in the year 2020 and the same trend may also be expected in 2025.

Table – 3: Authorship pattern of publication

S. No	Authors	No. of. Publications	%
1	Single Author	35	0.66
2	Two authors	478	9.04
3	Three authors	844	15.95
4	Four authors	1030	19.47
5	Five authors	904	17.09
6	Six authors	704	13.31
7	Seven authors	500	9.45
8	Eight authors	328	6.20
9	Nine authors	173	3.27
10	Ten authors	128	2.42
11	More than ten authors	166	3.14
Total		5290	100

Figure – 3.1: Authorship pattern of publication

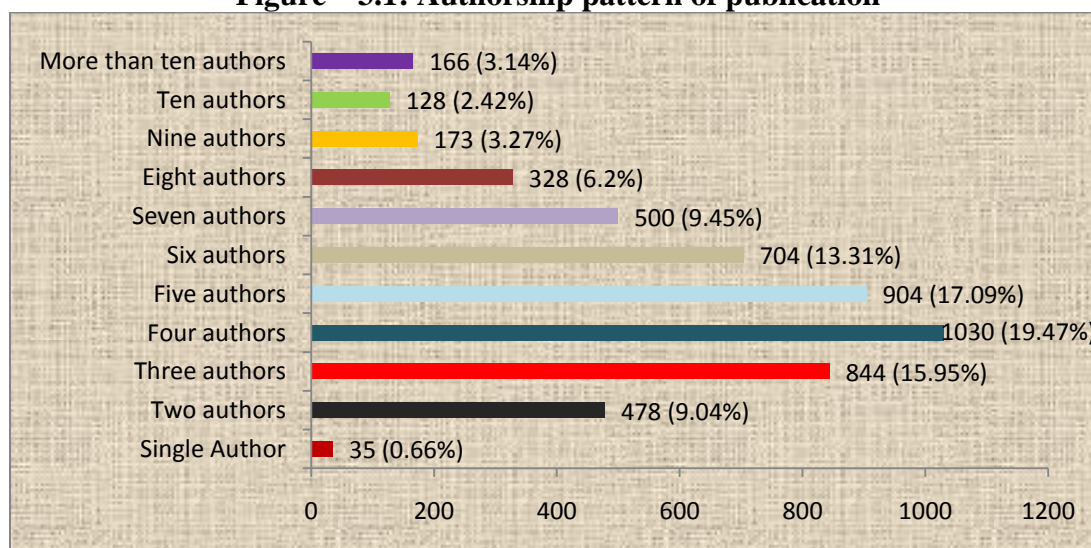


Table 3 and Figure 3.1 examine that the authorship pattern among Applied and Environmental Microbiology Journal research output. The highest number of papers published by four authors 1030 (19.47%), followed by five authors 904 (17.09%). Three authors were 844 (15.95%), six authors were 704 (13.31%), seven

authors were 500 (9.45%), two authors were 478 (9.04%) eight authors 328 (6.20%), nine authors were 173 (3.20%), more than ten authors were 166 (3.14%), ten authors were 128 (2.42%). The lowest numbers of authors were published 35 (0.66%). This study reveals that the majority of the articles published by four authors 1030 (19.47%)

Table – 4: Single Vs Multiple Authors

S. No	Authorship Pattern	Publications	%
1	Single author	35	0.66
2	Multiple authors	5255	99.34
Total		5290	100

Figure – 4.1: Single Vs Multiple Authors

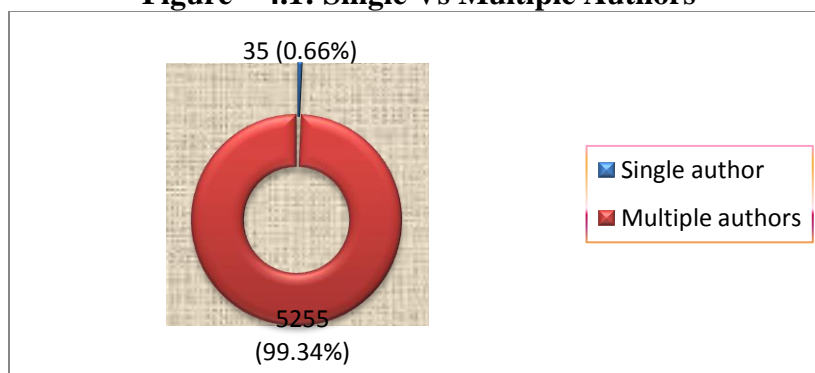


Table 4 and figure 4.1 show that the single author Vs multiple authors of Applied and Environmental Microbiology Journal research output during the year 2006-2010. For the purpose of analysis, the researchers have classified the study two phase viz., first phase single author and next phase multi-authors. It is clear the following that the single author records are 35 (0.66%) and multiple authors were 5255 (99.36%). Finally the majority of the articles published in multiple authors in this period from 2006 to 2010.

Table – 5: Year wise Authorship pattern of AEMJ Research output

Authors / Year	1	2	3	4	5	6	7	8	9	10	10+	Total	%
2006	9	226	552	892	850	906	588	496	279	180	546	5524	19.84
2007	10	202	486	836	935	780	840	568	216	310	326	5509	19.78
2008	8	186	465	792	915	864	616	488	432	210	472	5448	19.57
2009	6	198	522	792	865	774	686	512	315	270	525	5465	19.63
2010	2	144	507	808	955	900	770	560	315	310	628	5899	21.19
Total	35	956	2506	4120	4520	4224	3500	2624	1557	1280	2497	27845	100

Table 5 examine that the authorship pattern is analyzed to determine the type of research and their percentage; it is found that the authorship pattern of Applied and

Environmental Microbiology research during the period 2006-2010, the highest number of records in the year 2010 produced by five authors 955 records , 935

records and 915 records respectively. The majority of the records published from 5899 in the year of 2010. The lowest number of records in the year 2010 produced by single author. Among this authorship pattern, four,

five and six authors collaboration output has been leading level in Applied and Environmental Microbiology research output.

Table – 6: Degree of collaboration

Year	Single Authors (Ns)	Multiple Authors (Nm)	Total (Ns+Nm)	Degree of collaboration C (Nm/Ns+Nm=C)
2006	9	5515	5524	1.00
2007	10	5499	5509	1.00
2008	8	5440	5448	1.00
2009	6	5459	5465	1.00
2010	2	5897	5899	1.00
Total	35	27810	27845	5.00

Table shows the degree of collaboration in the studies. It was calculated using Subramanian’s formula:

$$C = \frac{Nm}{(Nm + Ns)}$$

Where C = Degree of Collaboration,

Nm = Number of Multi-authored works

Ns = Number of single-authored works.

It is found that the degree of author collaboration in the Applied and Environmental Microbiology Journal ranged from 1.00 to 1.00 during the period under

study. In comparison, Where C = Degree of collaboration 5.00, Nm = Number of multi-authored works 27810, Number of single – authored works 35.

Table – 7: Author Productivity (Productivity per Authors)

S. No	Year	Total no. of. Papers	Total no. of. Authors	AAPP	Productivity Per Authors
1	2006	1088	5524	5.077	0.197
2	2007	1069	5509	5.153	0.194
3	2008	1036	5448	5.259	0.190
4	2009	1043	5465	5.240	0.191
5	2010	1080	5899	5.462	0.183
Total		5316	27845	26.191	0.96

Table 7 show that the data related to authors productivity. The total average number of author’s paper is 26.191 and the average productivity per authors is 0.96. The

highest number of author’s productivity 5899 was in 2010. The minimum number of author’s productivity 5448 was in 2008.

Table – 8: Relative Growth Rate and Doubling Time of Applied and Environmental Microbiology Journal Publications

S. No	Year	R. o/p	Log _e 1 ^P	Log _e 2 ^P	Rt(p)	Dt (p)
1	2006	1088	-	6.992	-	-
2	2007	1069	6.992	7.676	1.098	0.631
3	2008	1036	7.676	7.652	0.997	0.695
4	2009	1043	7.652	7.640	0.998	0.694
5	2010	1080	7.663	7.661	1.003	0.691
Total		5316			4.096 (0.82)	2.711 (0.54)

Table 8 predicts data of relative growth rate and doubling time for total research output on Applied and Environmental Microbiology Journal. The analysis of Applied and Environmental Microbiology Journal research output at International visual aid provides the following facts: it is observed that its relative growth rates have contradicted progressively from 1.098 at 2007 to 1.003 in

the year 2010. During the whole study period sample mean relative growth rate is 4.099 and its average value is 0.82 contrary to this, the 'Doubling Time' for publication of all sources in Applied and Environmental Microbiology Journal research output has decreased from 0.631 year at 2007 to 0.691 years at 2010. During the study period doubling time values is 0.54 years.

Table –9: Collaborative Index (CI)

S. No	Year	No. of. Articles	Number of Authors	Collaborative Index
1	2006	1088	5524	5.077
2	2007	1069	5509	5.153
3	2008	1036	5448	5.259
4	2009	1043	5465	5.240
5	2010	1080	5899	5.462
Total		5316	27845	5.238

Table 9 show that the distribution of year wise Collaborative Index has been presented in the table. Collaborative Index

has been calculated with minimum of 5.077 in 2006 and maximum of 5.462 in 2010. The average Collaborative Index is 5.238.

Table – 10: Time Series Analysis of Multi- Authored articles

Year	No. of. Publications	X	X ²	Xy
2006	5515	-2	4	-11030
2007	5499	-1	1	-5499
2008	5440	0	0	0
2009	5459	1	1	5459
2010	5897	2	4	11794
Total	27810		10	724

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

Straight Line $Y = a + bX$:

Since $\sum x = 0$

$$a = \frac{\sum Y}{N} = \frac{27810}{5} = 5562.0$$

$$b = \frac{\sum Y}{\sum X^2} = \frac{724}{10} = 72.4$$

Estimated literature in 2020 is when $X = 2020 - 2008 = 12$
 $= 5562.0 + 72.4 \times 12$
 $= \mathbf{67612.8}$

Estimated literature in 2025 is when $X = 2025 - 2008 = 17$
 $= 5562.0 + 72.4 \times 17$
 $= \mathbf{95784.8}$

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 co-authored

publications of articles in the journal research. Hence, the trend of co-authorship according to the Time series analysis will be registered as 41.38 percent growth in 2020; while in the 2025, the growth will be expected as more than 58.62% percent of contributions by multi authorship.

Table – 11: Prolific Authors highest researcher productivity (Top 20)

S. No	Author	Records	%
1	Steinbuchel A	25	0.5
2	de Vos WM	21	0.4
3	Fitzgerald GF	21	0.4
4	Wiedmann M	20	0.4
5	Kathariou S	19	0.4
6	De Vuyst L	18	0.3
7	Kuipers OP	18	0.3
8	Pronk JT	18	0.3
9	Abee T	17	0.3
10	Hill C	17	0.3
11	Ross RP	17	0.3
12	Zhou JZ	17	0.3
13	Besser TE	16	0.3
14	van Sinderen D	16	0.3
15	Drake HL	15	0.3
16	Tiedje JM	15	0.3
17	Verstraete W	15	0.3
18	Fukatsu T	14	0.3
19	Keevil CW	14	0.3
20	Moineau S	14	0.3

Table 11 shows that the prolific authors of Applied and Environmental Microbiology. The total numbers of prolific authors are 27865. The productivity of authors during the period of study Steinbuchel A has published 25 (0.5%) articles were occupies the first rank. Followed by the author of de vos WM and Fitzgerald GF published 21 (0.4%) articles were occupy the second rank. Wiedmann M authors were published 20 (0.4%) articles occupies the third rank. Kathariou S author

7. FINDINGS AND CONCLUSION

- ❖ The study reveals that the majority of the articles published in the year of 2006 a total of publications were 1088 (20.5%).
- ❖ The results of the Time Series, it is found that the trend of Applied and Environmental Microbiology research output by publication shows up an increasing trend and estimated in the year 2020 and the same trend may also be expected in 2025.
- ❖ This study reveals that the majority of the articles published by four authors 1030 (19.47%)
- ❖ The majority of the articles published in multiple authors in this period from 2006 to 2010.
- ❖ Among this authorship pattern, four, five and six authors collaboration output has been leading level in Applied and Environmental Microbiology research output.
- ❖ It is found that the degree of author collaboration in the Applied and Environmental Microbiology Journal ranged from 1.00 to 1.00 during the period under study. In comparison, Where $C = \text{Degree of collaboration}$ 5.00, $N_m = \text{Number of multi-authored works}$ 27810, $N_s = \text{Number of single-authored works}$ 35.

were published 19 (0.4%) of articles occupies the fourth rank. De Vuyst L, Kuipers OP and Pronk JT author were published 18 (0.3%) of articles were occupy the fifth rank. Abee T, Hill C, Ross RP and Zhou JZ were published 17 (0.3%) of articles were occupies the seventh rank. Drake HL, Tiedje JM were published 15 (0.3%) of articles were occupies the eight rank. Fukatsu T, Kee cil CW and Moineau S were published 14 (0.3%) of articles were occupies the Ninth rank.

- ❖ The highest number of author's productivity 5899 was in 2010. The minimum number of author's productivity 5448 was in 2008.
- ❖ The whole study period sample mean relative growth rate is 4.099 and its average value is 0.82 .During the study period doubling time values is 0.54 years.
- ❖ The distribution of year wise Collaborative Index has been presented in the table. Collaborative Index has been calculated with minimum of 5.077 in 2006 and maximum of 5.462 in 2010. The average Collaborative Index is 5.238.
- ❖ Inference is that the rate of growth is positive in co-authored publications of articles in the journal research. Hence, the trend of co-authorship according to the Time series analysis will be registered as 41.38 percent growth in 2020; while in the 2025, the growth will be expected as more than 58.62% percent of contributions by multi authorship.
- ❖ The productivity of authors during the period of study Steinbuchel A has published 25 (0.5%) articles were occupies the first rank.

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