
World Literature on Environmental Management Research: A Scientometric Study

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Abstract

The study of the analyses the Environmental Management research output from around the world during 1989-2014 on different parameters including the growth, global publications, contribution of major collaborative countries, most productivity institutions, contribution of various subjects fields and most productive journals. Web of Science database has been used to retrieve the data for 26 years (1989-2014) by search string is Environmental management. Totally 61877 records were retrieved from the database. The growth trend in booming taken the sample duration in this field of Environmental Management research output.

Keywords

Environmental Management; Research Productivity;
Growth rate; Scientometric analysis; collaboration.

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INTRODUCTION

Environment literally means Surrounding in which we are living. Environment includes all those things on which we are directly or indirectly dependent for our survival, whether it is living component like animals, plants or non living component like soil, air water. Environmental studies are the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It involves the mobilization of resources and the use of government to administer the use of both natural and economic goods and services. “Scientometrics” can be defined as the measuring of scientific and technological activity. Bibliometric is a branch of scientmetric that focuses principally on the quantitative study of scientific publication for statistical purpose.

OBJECTIVES OF THE STUDY

1. To examine the growth rate and doubling time of Environmental Management output.
2. To identify the source wise research publications in the field.
3. To know the output with respect to the country.
4. To identify the core journal in the field of Environmental Management research.
5. To identify the institution wise distribution

DATA SOURCE AND METHODOLOGY

There are various sources contributing to the research output in the field of Environmental Management research by the scientist all over the world. The necessary data were collected from database of SCI, SSCI, and A&HCI to (totally twenty six years) to download the records from web of Knowledge. An advanced search strategy involving “Environmental Management” as the search string used to search and download data using title, Abstract and Keywords field, resulting in downloading of 61877 records based on the above string. The data were analyzed by using the Histcite and MSEXcel software application as per the objectives of the study.

DATA ANALYSIS AND INTERPRETATIONS

Relative Growth Rate and Doubling Time of Environmental Management Research

The analysis of the growth rate in Environmental Management research publications is one of the

prime aspects of discussion. Table 1 gives the year-wise distribution of articles in Environmental Management research. The number from year to year and increases in the number of articles from the year 1989-2014. Out of the total 61877 articles, the maximum number of articles in the year of 2014, contributing 6838 articles, which is 11.05% of total

publication. In this connection, a study on the growth rate of publications provides some useful results. The rate of growth of literature on Environmental Management research is determined by calculating relative growth rate (0.19) and doubling time (23.13 years) of the publication.

Table 1: Showing Growth Rate and Doubling time of Environment Management Research output

Year	R. o/p	Cum. o/p	$\log_e 1^p$	$\log_e 2^p$	Rt(P)	Dt(P)
1989	48	48	-	3.871	-	-
1990	111	159	3.871	4.709	0.839	0.826
1991	465	624	4.709	6.142	1.432	0.484
1992	593	1217	6.142	6.385	0.243	2.850
1993	689	1906	6.385	6.535	0.150	4.613
1994	824	2730	6.535	6.714	0.179	3.868
1995	974	3704	6.714	6.881	0.167	4.140
1996	996	4700	6.881	6.903	0.023	30.465
1997	1099	5799	6.903	7.002	0.098	7.060
1998	1137	6936	7.002	7.036	0.034	20.294
1999	1268	8204	7.036	7.145	0.109	6.346
2000	1543	9747	7.145	7.341	0.196	3.527
2001	1532	11279	7.341	7.334	0.007	99.000
2002	1751	13030	7.334	7.467	0.134	5.174
2003	2012	15042	7.467	7.606	0.139	4.990
2004	2008	17050	7.606	7.604	0.002	346.500
2005	2319	19369	7.604	7.748	0.144	4.816
2006	2719	22088	7.748	7.908	0.159	4.358
2007	3144	25232	7.908	8.053	0.145	4.771
2008	3728	28960	8.053	8.223	0.171	4.061
2009	4266	33226	8.223	8.358	0.134	5.155
2010	4582	37808	8.358	8.429	0.072	9.640
2011	5215	43023	8.429	8.559	0.129	5.360
2012	5749	48772	8.559	8.656	0.098	7.087
2013	6267	55039	8.656	8.743	0.086	8.053
2014	6838	61877	8.743	8.830	0.087	7.943
Total	61877				4.979 (0.19)	601.38 (23.13)

Document wise Distribution of Publications

Table 2 indicates that document wise output in Environmental Management research through various communication channels. Journal Articles channels are in the first position with 50360 (81.39%),

followed by Review which occupies the second place with 4979 (8.05%) records. Article; Proceedings Paper occupy the third place with 4879 (7.88%) records of the remaining literature. Remaining 12 percent of articles were comes through in other format communication channels.

Table 2: Source wise distribution of Environmental Management Research

Document Type	Recs.	LCS	GCS	Document Type	Recs.	LCS	GCS
Article	50360	54147	644579	Reprint	21	9	723

Review	4979	8677	38	Software Review	6	1	191
Article; Procs. Paper	4879	4826	95617	Discussion	4	8	182854
Editorial Material	875	941	60	Correction, Addition	2	0	5212
Book Review	285	5	7	Bibliographical Item	2	0	81
Review; Book Chapter	144	505	1	Database Review	1	0	551
Meeting Abstract	136	0	24	Item About an Individual	1	0	1
Note	42	41	9159	Bibliography	1	1	2
News Item	41	3	0	Chronology	1	0	0
Article ;Book Chapter	38	39	790	Music Score	1	0	0
Letter	36	129	0	Total	61877	69332	940030
Correction	22	0	140				

Table 3 indicates that the top twenty most productivity countries in research publications on Environmental Management. Generally, same article will calculate tow or many times based on their collaborative trends. According to that, United States of America has the first place with 18140 (60.5%)

records, and followed by United Kingdom with 6722 (22.0%) second position, Australia with 5113 (16.0%) third position, Canada with 4591 (15.1%) and Peoples R China with 3543 (9.7%) fourth and fifth position among these countries.

Table 3: Most Productivity Countries (top 20 countries, totally 194 countries)

Country	Recs.	TLCS	TGCS	Country	Recs.	TLCS	TGCS
USA	18140	23901	372885	Netherlands	2059	3492	46586
UK	6722	9860	137962	Brazil	1754	1150	12952
Australia	5113	8130	90905	Sweden	1357	2398	28760
Canada	4591	7338	85807	Japan	1154	1022	11170
Peoples R China	3543	4859	36093	India	1121	1002	13456
Spain	2862	2748	34001	Unknown	1094	1213	8275
Germany	2682	3681	39718	Switzerland	1032	1654	22732
Unknown	2657	1826	47669	South Africa	905	1056	13290
France	2528	2701	40050	Denmark	853	1905	16479
Italy	2475	2819	29271	New Zealand	848	1159	16277

Journal wise Distribution of Publications

The study found that the total research output of the Environmental Management for the study period (1989-2014) published in 6192 journals. The scientists have published the highest number of

article in the Journal of Environmental Management, which is about 930 (2.9%), followed by Environmental Management 813 (2.9%) and Journal of Cleaner Production 812 (2.4%) occupied third and fourth positions.

Table 4: Most Productivity Journals in Environmental Management Research

S.No	Journal Name	Recs.	%	TLCS	TGCS
1	Journal of Environmental Management	930	2.9	2330	14297
2	Environmental Management	813	2.9	1377	11925
3	Journal of Cleaner Production	812	2.4	2572	10827
4	Forest Ecology and Management	522	1.6	585	10041

5	Agriculture Ecosystem and Environments	462	1.6	975	12141
6	Ecological Economics	455	1.4	1547	8808
7	Science of the Total Environment	445	1.4	693	7405
8	Resources Conservation and Recycling	384	1.2	927	5367
9	Environmental Monitoring and Assessment	380	1.2	274	3073
10	PLOS One	380	1.2	0	2107

Language wise Distribution of Publications

Research literature on Environmental Management has been published in various journals in various languages. Among them English ranks the first occupying nearly 96.84% of the total output. The

second ranked language is German, French and Spanish languages follow this. This is a clear indication that any other despite his country of origin or language publishes his research findings mainly in English rather than their own mother language

Table 5: Language wise Distribution of Environmental Management Research

Language	Recs.	Cum. Recs.	Cum. %	Language	Recs.	Cum. Recs.	Cum. %
English	59922	59922	96.84	Croatian	13	61830	99.92
German	617	60539	97.84	Chinese	9	61839	99.93
French	483	61022	98.62	Italian	9	61848	99.94
Spanish	336	61358	99.16	Norwegian	8	61856	99.95
Portuguese	195	61553	99.48	Dutch	5	61861	99.96
Japanese	95	61648	99.63	Rumanian	4	61865	99.97
Hungarian	41	61689	99.7	Serbian	3	61868	100
Czech	38	61727	99.76	Swedish	3	61871	-
Slovak	34	61761	99.81	Danish	2	61873	-
Russian	24	61785	99.85	Slovene	2	61875	-
Finnish	17	61802	99.88	Turkish	2	61877	-
Polish	15	61817	99.9	Total	61877	61877	100

Institution wise Distribution of Publication

The below table analysis indicates Institution wise research productivity. It is noted that 28127 institutions were contributed of the total research

productivity in the subject of Environmental Management. It is noted that Chinese Academy of Sciences contribute the highest number of research publication (963) at the same time it ranks first in terms of global citation score 12754.

Table 6: Institution wise Distribution of Publications (Top 10)

S. No	Institution	Recs.	%	LCS	GCS	Country
1	Chinese Academy Sciences	963	2.9	959	12754	China
2	United States Department of Agriculture's- Agriculture Research Service (USDA-ARS)	635	2.3	1000	17456	USA
3	INRA- National Institute of Agricultural Research	549	1.6	731	9107	France
4	University of Florida	537	1.8	606	11011	USA
5	University of California Davis	530	1.7	544	11616	USA
6	United States Environmental Protection Agency	497	1.7	648	10207	USA

7	University of Queensland	467	1.3	719	7719	Australia
8	University of Wisconsin	463	1.5	570	10083	USA
9	University of Melbourne	405	1.2	728	7824	Australia
10	University of Washington	404	1.3	895	12048	USA

The below table 7 reveals that the zonal wise publications of journals on Management Information System research. It is concluded from the analysis that the first zone (forty) journals were found on nuclear or core sources (journals).

Table 7: Showing Bradford's Distribution of sources in Environmental Management

Zone	No. of sources	No. of records	Multiplier factor
Z ₁	89 (1.44)	20576 (33.25)	-
Z ₂	461 (7.48)	20914 (33.80)	5.18
Z ₃	5613 (91.08)	20387 (32.95)	12.18
Total	6163	61877	8.66

The researcher has grouped three types, such that; Z₁ – Zonal 1; Z₂ – Zonal 2 and Z₃ – Zonal 3. The first zone indicates the small groups of different types of sources, and it is called the nuclear or core zone. Here from this analysis, first zone representing 89 (1.44 %) of sources has produced 20576 (33.25 %) of articles. So those 89 journals (sources) were identified this subject research output in core journals. The second zone group of 461 (7.48 %) journals provides 20914 (33.8 %) articles, and the third largest zone of 5613 (91.08 %) of periodicals yield the remaining 20387 (32.95 %) articles. The Bradford multiplier between the number of references in zone 1 and zone 2 is 5.18 while it is 12.18 between zone 2 and zone 3. The average multiplier value is 8.66.

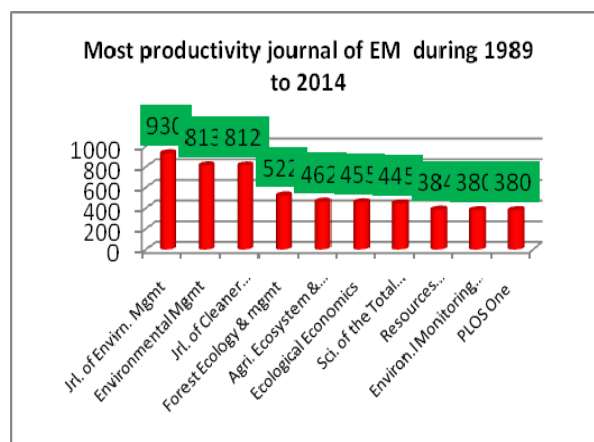
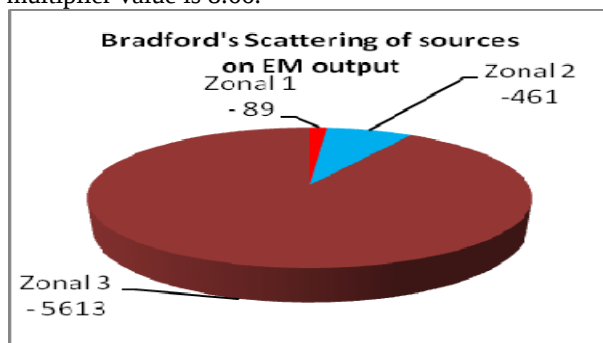


Fig: zonal wise analysis and most productivity journal on Environmental Management

According to Bradford's distribution, the relationship between the zone is 1: a: n². In contrast is the relationship in each of the present study i.e. 89:461:5613 which does not fit into Bradford's distribution. This is a clear indication that core zone is more concentrated and the other zone is much extended showing the scattering of journals on Management Information System research.

FINDINGS AND CONCLUSION

It is observed that from the above analysis, the highest quantity of literature was produced during the period 2011-2014 and the largest numbers of articles were published in 2014. USA occupies the first place for its contribution of publications and highest number of citation, h-index in environmental management. India occupies the 15th position in the world in terms of Publication. The journal of "Journal of Environmental Management" has produced more articles and highest citation score. Chinese Academy of Sciences contributed the highest number of research publications in Environmental Management.

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