A Scientrometric Analysis of Documents Types in Plastics Engineering With Special Analysis for Active and Property Index

R. Kavitha
Assistant Professor cum Assistant Librarian,
Department of Library and Information Science,
Mother Teresa Women's University,
Kodaikanal – 624101. Tamil Nadu, India.
E-Mail: kavitharamalar@gmail.com

S. Aravind
College Librarian and Head,
Department of Library and Information Science,
G.T.N. Arts College, Dindigul, India Email:
aravindlibrarian@gtnartscollege.ac.in

Abstract

The performance of study to take effort in the field of plastics engineering research and it is applications at global level contribution. This research study sample records downloaded from web of science database, totally five years of records during 2018 to 2022 publications with 56726 counts. The scientometrics research has been analyzed by using the scientometrics tools and techniques for analysis and documents types of journals by global scientist publications with special analysis for active and property index.

Keywords
Scientrometric Analysis, Documents Types, Plastics Engineering, Active and Property Index

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1. Introduction

The scientometrics research analysis has significant role of library and information science and explain theoretical and experimental discussions from the area of plastics engineering research publications. Scientometrics study to engage evaluation signifies global research output and with special analysis for active and property index study in the publication. According to Garfield 1979, 'the study of the measurement of scientific and technological progress', its origin is in the quantitative research study of science policy or the science of science which focuses on a wide variety of quantitative measurements of science and technology areas. Scientometrics is related to and has overlapping interests with Bibliometrics and Informatics. According to Hood W & Wilson C 2001 the terms Bibliometrics, Scientometrics and Informatics refer to component fields related to the study of the dynamics of disciplines as reflected in the production of their literature.

2. Web of Science

Web of Science (WoS) is a bibliographic database that covers the publications of about 12,000 and more journals in the sciences, the social sciences, engineering and technology, arts and humanities. Each journal in Web of Science is assigned to one or more subject categories. These subject categories can be interpreted as scientific fields. There are about 250 subject categories in Web of Science database. Some examples are Astronomy, Astrophysics, Economics, Philosophy, and Surgery. Multidisciplinary journals such as Nature, Proceedings of the National Academy of Sciences, and Science belong to a special subject category labeled multidisciplinary sciences. Each publication in Web of Science has a document type the most frequently occurring document types are article, book review, correction, editorial material, letter, meeting abstract, news item and review etc.

3. The Plastics

Plastics are macromolecules formed by Polymerization and having the ability to be shaped by the application of heat and pressure. They are synthetic chemicals extracted mainly from petroleum and composed of hydrocarbons is made of chains of hydrogen and hydrocarbon atoms. The small units of plastics (monomers) are linked together by chemical reactions to make long chains of thousands of atoms called polymers. Polymers are like lots of beads

strung on a long single string. When these small units of Plastics are combined in different orders, they make different kinds of plastic. Polymers can form very long straight or branched chains which give plastics very different physical properties.

According to Merriam Webster dictionary "any of numerous organic synthetic or processes materials that are mostly thermoplastics or thermosetting polymers of high molecular weight and that can be made into objects, films or filaments. According to Collins English dictionary "Plastics is a material which is produced from oil by a chemical process and which is used to make objects. It is light in weight and does not break easily.

4. Objective of the study

- ✓ Activity Index and Priority Index of Articles in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of Early Access in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of Editorial Materials in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of News Items in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of Other Publications in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of Proceeding Papers in Plastics Engineering Research Literature output
- ✓ Activity Index and Priority Index of Review Article in Plastics Engineering Research Literature output
- ✓ Distribution of Type Documents in Plastics Engineering
- ✓ Language Wise publications in Plastics Engineering Research Literature output

5. Activity Index and Priority Index

Priority Index (PI) has been calculated to properly normalize the size of authors and the size of the subject field so that cross international comparisons can be done for these "Frontier" areas of research on Plastics Engineering research literature output in global context.

Priority Index is computed by the following formula:

$$\text{Priority Index} = \frac{N_{ij}/N_{io}}{N_{oj}/N_{oo}} \times 100$$

where,

N_{ij} = the number of publications of country i in subfield j

N_{io} = the number of publications of country i is in all subfields of the major fields

N_{oj} = the number of publications of all countries viz., the total world output in subfield j

N_{oo} = the number of publications in all sub fields of those major fields

This index is identical to AI proposed and subsequently used among others by Schubert and Braun. The value of PI = 100 indicates that research priority of a country for a given subfield corresponds precisely to the average of all countries.

PI = 100 indicates average priority,
PI > 100 indicates higher than average priority and
PI < 100 lower than average priority

It should, however, be kept in mind that (by virtue of definition of PI); no author can have high or low priority in all sub fields. From the values of PI, we can compare

(1) The priorities of a given country to different subfields in a given time span
(2) The priorities of different countries to a given subfield in a given time span
(3) The priority to a given subfield in different time spans.

Table 1: Distribution of Type Documents in Plastics Engineering

S.No	Document Type	Years					Total	Percentage
		2018	2019	2020	2021	2022		
1.	Article	9067	10371	10200	12080	9864	51582	90.927
2.	Review Article	302	394	547	842	681	2766	4.876

3.	Early Access	0	18	35	112	1155	1320	2.327
4.	Proceeding Paper	210	221	137	17	18	603	1.064
5.	Editorial Material	20	21	37	49	45	172	0.303
6.	News Items	26	27	25	21	11	110	0.194
7.	Correction	10	9	7	17	12	55	0.097
8.	Meeting Abstract	13	18	3	7	0	41	0.072
9.	Letter	5	4	3	14	7	33	0.058
10.	Book Chapters	5	3	7	17	0	32	0.056
11.	Retracted Publication	4	1	1	0	1	7	0.012
12.	Retraction	1	0	3	0	0	4	0.007
13.	Book Review	0	0	2	1	0	3	0.005
14.	Data Paper	1	0	0	0	0	1	0.002
	Total	**9664**	**11087**	**11007**	**13177**	**11794**	**56729**	**100.00**

The above table revealed the number of documents such as Articles, Review Article, Book Chapters, Editorial Material and proceedings papers published for the period of five years from 2018 to 2022. Among various items published on Plastics Engineering Research Literature, Articles stood first with total number of records 51582 (90.927 percent), followed by review article 2766 (4.876 percent), proceedings papers 603 (1.064 percent), news items 110 (0.194 percent), editorial material 172 (0.303 percent) and early access 1320 (2.3270 percent). In between the categories in the year 2021 there are 12080 articles published.

Table 2: Activity Index and Priority Index of Articles in Plastics Engineering Research Literature output

S. No	Year	R.O./P of Articles	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
1.	2018	9067	17.58	9664	17.04	1.03	103
2.	2019	10371	20.11	11087	19.54	1.03	103
3.	2020	10200	19.77	11007	19.40	1.02	102
4.	2021	12080	23.42	13177	23.23	1.01	101
5.	2022	9864	19.12	11794	20.79	0.92	92
	Total	**51582**	**100.00**	**56729**	**100.00**		

The above table indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2018 (103), 2019 (103), 2020 (102) and 2021 (101) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher level to calculate the articles in plastics engineering research literature output.

The table 3 indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2020 (102), 2021 (131) and 2022 (118) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher level to calculate the review articles in plastics engineering research literature output.

Table 3: Activity Index and Priority Index of Review Article in Plastics Engineering Research Literature output

S. No	Year	R.O./P of Review	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
1	2018	302	10.92	9664	17.04	0.64	64
2	2019	394	14.24	11087	19.54	0.73	73
3	2020	547	19.78	11007	19.40	1.02	102
4	2021	842	30.44	13177	23.23	1.31	131
5	2022	681	24.62	11794	20.79	1.18	118
	Total	**2766**	**100.00**	**56729**	**100.00**		

Table 4: Activity Index and Priority Index of Early Access in Plastics Engineering Research Literature output

S.No	Year	R.O./P of Early Access	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value

1.	2018	0	0.00	9664	17.04	0.00	00
2.	2019	18	1.36	11087	19.54	0.07	07
3.	2020	35	2.65	11007	19.40	0.14	14
4.	2021	112	8.49	13177	23.23	0.37	37
5.	2022	1155	87.50	11794	20.79	4.21	421
Total		**1320**	**100.00**	**56729**	**100.00**		

The above table indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The year 2022 (421) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is low priority level to calculate the early access in plastics engineering research literature output.

The table 5 indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2018 (204), 2019 (188) and 2020 (117) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher priority to calculate the proceeding papers in plastics engineering research literature output.

Table 5: Activity Index and Priority Index of Proceeding Papers in Plastics Engineering Research Literature output

S. No	Year	R.O./P of Proceeding Papers	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
1.	2018	210	34.83	9664	17.04	2.04	204
2.	2019	221	36.64	11087	19.54	1.88	188
3.	2020	137	22.72	11007	19.40	1.17	117
4.	2021	17	2.82	13177	23.23	0.12	12
5.	2022	18	2.99	11794	20.79	0.14	14
Total		**603**	**100.00**	**56729**	**100.00**		

Table 6: Activity Index and Priority Index of Editorial Materials in Plastics Engineering Research Literature output

S. No	Year	R.O./P of Editorial	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
		Materials					
1.	2018	20	11.63	9664	17.04	0.68	68
2.	2019	21	12.21	11087	19.54	0.62	62
3.	2020	37	21.51	11007	19.40	1.11	111
4.	2021	49	28.49	13177	23.23	1.23	123
5.	2022	45	26.16	11794	20.79	1.26	126
Total		**172**	**100.00**	**56729**	**100.00**		

The above table indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2020 (111), 2021 (123) and 2022 (126) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher level priority to calculate the editorial materials in plastics engineering research literature output.

Table 7: Activity Index and Priority Index of News Items in Plastics Engineering Research Literature output

S. No	Year	R.O./P of News Items	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
1.	2018	26	23.64	9664	17.04	1.39	139
2.	2019	27	24.54	11087	19.54	1.26	126
3.	2020	25	22.73	11007	19.40	1.17	117
4.	2021	21	19.09	13177	23.23	0.82	82
5.	2022	11	10.00	11794	20.79	0.48	48
Total		**110**	**100.00**	**56729**	**100.00**		

The above table indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2018 (139), 2019 (126) and 2020 (117) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher level priority to calculate the news items in plastics engineering research literature output.

Table 8: Activity Index and Priority Index of Other Publications in Plastics Engineering Research Literature output

S .No	Year	R.O./P of Other Publications	COP=A	W.O/P	WOP=B	A/B=AI Value	PI Value
1.	2018	39	22.16	9664	17.04	1.30	130
2.	2019	35	19.89	11087	19.54	1.02	102
3.	2020	26	14.77	11007	19.40	0.76	76
4.	2021	56	31.82	13177	23.23	1.37	137
5.	2022	20	11.36	11794	20.79	0.55	55
	Total	**176**	**100.00**	**56729**	**100.00**		

The above table indicates the activity index and priority index values the output on plastics engineering research literature outputs during the years 2018 to 2022. The PI value is measured higher than 100 (PI >100) enjoys a higher priority at global level, less than 100 (PI <100) is low priority and round value of 100 (PI=100) is of average priority considering the global output. The years 2018 (130), 2019 (102) and 2021 (137) have high priority among the selected periods. The remaining years are having the lowest priority with PI value being less than 100. So that period's publication is higher level priority to calculate the other publications (correction, meeting abstract, letter, book chapters, retracted publication, retraction, book review and data paper) in plastics engineering research literature output.

Table 9: Language Wise publications in Plastics Engineering Research Literature output

S.No	Language	Count	Percentage
1.	English	56239	99.136
2.	Chinese	298	0.525
3.	Japanese	76	0.135
4.	Korean	36	0.064
5.	Portuguese	26	0.047
6.	German	23	0.041
7.	Turkish	17	0.030
8.	Spanish	8	0.015
9.	Polish	2	0.003
10.	Czech	1	0.001
11.	Italian	1	0.001
12.	Malay	1	0.001
13.	Russian	1	0.001
	Total	**56729**	**100.00**

The above table revealed that the language wise plastic engineering research. Out of 56729 publications, English language wise published with 56239 (99.136 percent) publications in top most level followed by Chinese 298 (0.525 percent), Japanese 76 (0.135 percent) and Korean 36 (0.064 percent) of publication in plastic engineering research.

6. Conclusion

The research has completed data was obtained from the web of science database; duration is 2018 to 2022 consists of 56729 research publications. It was found after 2019 has good number of publications in this field. All contributors were preferred the publication channel is for their productivity. It is possible to higher level priority and positive growth trend in future of plastics engineering research output.

7. References

[1.] Broadus R N (1987). Definition of Bibliometric. *Scientometrics*.12: 373-398.
[2.] Dave N C (2013). Plastic Technical hand book, 12thed, Mumbai.
[3.] Garfield, E (1979). From the science of science to Scientometrics visualizing the history of science with HistCite software. *Journal of Infometrics*. 3(3): 173 –179.
[4.] Hood W. W and Wilson C (2001). The Literature of Bibliometrics, Scientometrics and Infometrics. *Scientometrics*.52 (2): 291 –314.
[5.] http://www.merriam-webster.com/help/citing-the-dictionary
[6.] Narin F and Moll J K (1977). Bibliometrics. *Annual Review of Information Science and Technology*, 12: 35-58.
[7.] Pritchard A (1989). Statistical Bibliography on bibliometrics. *Journal of Documentation*, 25(4): 48-49.
[8.] Sengupta I and W Lalita Kumari.(1991). Bibliometric Analysis of Aids Literature: *Scientometric*. 20(1): 297-315.