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Scientometric Analysis of Synthetic Fiber Literature

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Abstract

A Quantitative study of research papers published in Synthetic Fiber Research from 2008-2017 was undertaken to investigate the research output in this field. The study made by applying various parameters for capturing the trend-growth pattern of the literature, Relative Growth Rate, Doubling Time, authorship pattern, Prolific author and Top ranking Journals etc., The data were obtained from scopus database. Articles published from 2008 – 2017 were taken for this study. A total of 2594 articles were published in this field with an yearly average of 259.4 articles. . Out of the 2594 articles, the majority of the articles 421 (16.23%) were published in the year 2017. The RGR in the year 2009 found to be 2.05 and in the end year 2017 found to be 0.12. This shows that the RGR declining trend is linear. Among the Authorship patterns, the major contribution of articles were from three authors 534 (20.59%). The Journal named "Advanced Materials Research" ranked in the top position in contributing articles 59 (2.28%) in this field. The highly prolific author is Monteiro S.N who has contributed 41 articles 0.47 %.

Keywords: Synthetic fiber; Publishing Trend; Relative growth rate; Authorship productivity; Prolific Authors

1. Introduction

This article is attempted to analyse the performance of synthetic fiber research output and to study the growth rate, authorship pattern, journal coverage and author productivity and future scope of research in this field of Synthetic fiber. As far as the libraries are concerned, this quantitative research plays a vital role in the decision making in purchasing essential books on any growing field of knowledge. Synthetic fiber is a chain of small chemical units joined together. Each small unit is called a monomer and the large chain formed of many such monomers is called a polymer. Synthetic fibers are made up of such polymers. Synthetic fiber are made from petroleum based chemicals. Synthetic fibers are the result of extensive research by scientists to improve on naturally occurring animal and plant fibers. Nowadays there are many classes of fibers are widely in usage, Synthetic Fibers such as nylon, polyester, acrylic and polyolefin – dominate the market. These synthetic fibers account for 98 per cent of synthetic fiber production, where else polyester were used around 60 percent. Synthetic fiber has wide range of Application from Textile industry to aerospace industry. High performance fiber such as carbon fiber, glass fiber are used in aerospace industries, automotive industries & engineering Industries and in making high end cars, bio medical devices and sporting goods.

2. Review of literature

Gupta, Dhawan & Ritu (2017)[1] examined 3779 global publications on mobile computing research covered in scopus database during 2007-16. The study reveals that cloud computing research registered a high growth of 139.6% per annum. China found to be the top most productive country in the world in Cloud computing research. The top most 20 productive journals which published cloud computing literature accounts for 30% share of total publications output.

Naqvi (2017)[2] investigated the literature trends of genetic engineering and observed that the growth rate was not constant during the study period. The RGR showed a decreasing trend. However the Doubling time has increased from 1.23 in the year 2007 to 7.23 in the year 2015.

Chaman., Dharani kumar, and Biradar Das(2017)[3] analysed the publication output in Oceanography literature during 2011-15. Based on the study results that most of the researchers preferred to publish in journals. National Institute of Oceanography has produced highest no. of articles among the Indian Organizations. The Maximum Research priority were given to Engineering areas in Oceanography Research.

Pandey (2016)[4] analysed stem cell research output for the period of 25 years. The study observed a notable growth in stem cell research publication from India. Author finds that US found to be the largest collaborative partner of India in stem cell research. Various parameters used for analysis are growth rate, h-index, impact per paper, citation analysis, and degree of collaboration. Pandey and Desai thus concluded that there exists a rapid growth in stem cell research in last 25 years.

Manimegalai and Ravi (2014)[5] evaluated the research trend in Fashion technology research for the period 1970-2013. Author concludes after the analysis that there exist a parabolic growth of publication output In the field of research of fashion technology. The ROG (Ratio of growth) ranges between 0.97 and 2.02 which indicates that publications are increasing. Relative growth is linear in nature. Similarly doubling time also shows linear trend.

Ashok kumar and Gopalakrishnan (2013)[6] analysed Textile Research output in which the Indian publications on Textile research found to be in linear trend and the the relative growth rate is too linear in nature. The findings shows their exist negative growth in certain period both in RGR and DT. Similarly the doubling time also shows linear trend and few exceptions.

Baskaran (2013) [7] examined the research publications of Alagappa University in which the the study revealed that Collaboration papers are more in this University publications.RGR found to be fluctuating. And Author identified that there is steady growth in research productivity.

Kamal Lochan jena (2006)[8] analysed the Journal Indian Journal of Fiber and textile research for the period 1996-2004,, jena studied the year wise distribution of publication, citation pattern of articles, authorship pattern and Geographical distribution of contributors of articles. The results revealed that there was an increasing trend in the publication output from the year 1996, regarding bibliographical distribution of citation, journal form is predominant, while considering the authorship pattern three authored paper were found to be higher. Subject wise

analysis of article shows that the areas of study has been more concentrated on Production and properties of Fiber, Yarns and Fabrics and their chemical process.

Mohan, Gupta & Dhawan (2003)[9] analysed material science research in India the investigation shows that the most of the work involved were bilateral collaboration. The preferred areas of collaboration were found to be Superconductivity, Metals and alloys, and electronic and magnetic materials.

3. Methodology

The required data for this study, the literature on Synthetic fiber has been downloaded from "Scopus" database which is an international indexing and abstracting database using the search term "Synthetic Fiber". For this study literature published from 2008 to 2017 has been downloaded from the database. A total of 2594 data has been identified. The collected data has been classified by using Excel

For the purpose of analysis, scientometric techniques such as Authorship pattern, Relative growth rate and doubling time will be used for the study.

Limitations

The following are the limitations to the study:

1. This study is confined to the Scopus database alone.
2. Literature published from 2008 to 2017 only taken up for the study.

4. Results and Discussions

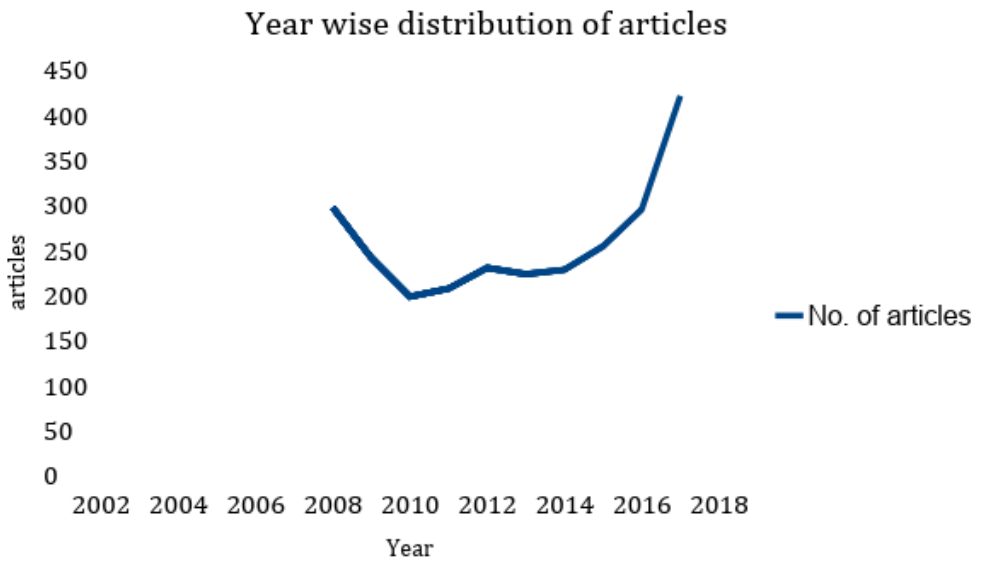
4.1 Year wise Distribution of Publications.

Table 1. Shows the year wise distribution of articles. Out of the total 2594 articles the highest no of articles (421) were contributed in the year 2017, which is 16.23% to the total publications. The minimum no. of articles were published in the year 2010 with 198 articles which is 7.63% of total publications.

Table. 1: Year wise Distribution

Year	No. of articles	Percentage	Cumulative	Cumulative %
2008	297	11.45	297	11.45
2009	241	9.29	538	20.74
2010	198	7.63	736	28.37
2011	207	7.98	943	36.35
2012	230	8.87	1173	45.22
2013	223	8.60	1396	53.82
2014	228	8.79	1624	62.61
2015	254	9.79	1878	72.40
2016	295	11.37	2173	83.77
2017	421	16.23	2594	100
Total	**2594**	**100**		

Fig. 1: Year wise Distribution



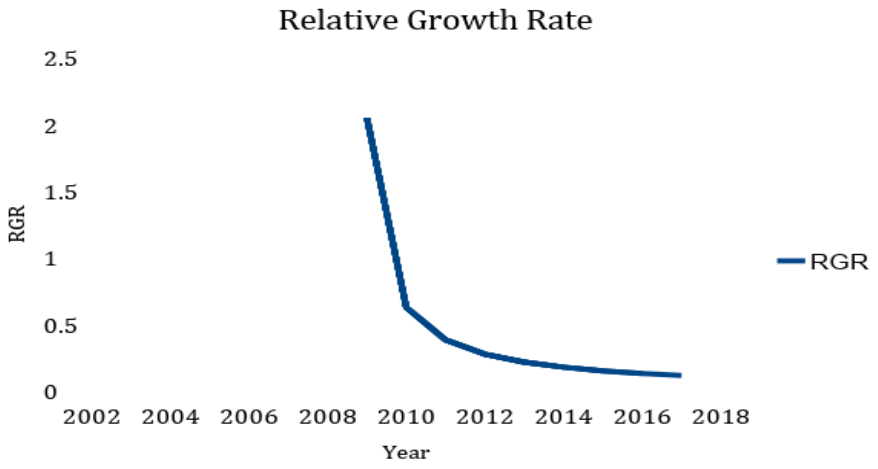
4.2 Relative growth rate and doubling time of Year wise publications

Table 2. depicts the relative Growth of time and Doubling Time. The relative growth rate is the increase in the number articles per unit of time. It can be seen from the table the relative growth is linear decline in nature. The RGR decreased from 2.05 in 2009 to 0.12 in 2017. The doubling time shows increasing trend. The data in the table shows that the DT has increased from 0.34 in 2009 to 5.97 in 2017.

Table 2: Relative Growth rate and Doubling time.

Year	No. of articles	Cumulative	W1	W2	RGR	DT
2008	297	297		5.69		
2009	241	2306	5.69	7.74	2.05	0.34
2010	198	4316	7.74	8.37	0.63	1.11
2011	207	6327	8.37	8.75	0.38	1.81
2012	230	8339	8.75	9.03	0.28	2.51
2013	223	10352	9.03	9.24	0.22	3.20
2014	228	12366	9.24	9.42	0.18	3.90
2015	254	14381	9.42	9.57	0.15	4.59
2016	295	16397	9.57	9.70	0.13	5.28
2017	421	18414	9.70	9.82	0.12	5.97
Total	**2594**					

Fig. 2: Relative Growth rate and Doubling time.



4.3 Authorship Pattern

The pattern of authorship has been presented in the below table 3. It is observed from the table 3. That most of the papers (99.96%) are contributed by multi authored. Only 17.54 % of the papers are contributed by single author. Highest number of papers (20.59%) is contributed by three authors followed by two authors with 20.20% . Only one paper has been contributed with highest number of authors (28). The team research has dominated in the field of Synthetic fiber.

Table 3: Pattern of Authorship

Authorship	No. of articles	Percentage	Cumulative	Cumulative %
1	455	17.54	455	17.54
2	524	20.20	979	37.74
3	534	20.59	1513	58.33
4	461	17.77	1974	76.10
5	293	11.30	2267	87.39
6	150	5.78	2417	93.18
7	82	3.16	2499	96.34
8	51	1.97	2550	98.30
9	17	0.66	2567	98.96
10	13	0.50	2580	99.46
11	5	0.19	2585	99.65
12	3	0.12	2588	99.77
13	2	0.08	2590	99.85
15	1	0.04	2591	99.88
18	1	0.04	2592	99.92
26	1	0.04	2593	99.96
28	1	0.04	2594	100
Total	**2594**	**100**		

4.4 Ranking of authors

Table 4. Shows the ranking of authors. In this analysis top 10 authors have been listed out based on their no. of contribution. Author Monteiro, S.N topped the rank with 41 publications. Margem F.M has contributed 28 articles followed by Zhang Y with 16 contribution.

Table 4: Prolific Authors

S. No	Author name	Publications	Percentage
1	Monteiro S.N	41	0.47
2	Margem F.M	28	0.32
3	Zhang Y	16	0.18
4	Sapuan S.M	14	0.16
5	Wang H	14	0.16
6	Jawaid M	13	0.15
7	Wang X	13	0.15
8	Altoé G.R	11	0.13
9	Li H	11	0.13
10	Simpson P.	11	0.13
11	Anonymous	68	0.77
12	Others	8559	97.27
	Total	8799	100

4.5 Most productive 25 journals in Synthetic fiber research during 2008-2017

Journals are the major sources of Research publication. Table 5. Shows top 25 Journals which published papers on Synthetic fiber research during 2008-2017 as per scopus database. The study shows that Advanced Materials research is the most productive journal which published 59 articles followed by the Journal Construction and Building Materials with 51 articles contributing for 1.92% of total output. The Advanced materials Research and Construction and Building Materials Journals where found to be the most preferred journals for Synthetic fiber research. The Journals BioResources and International Fiber Journal found to publish least no. of journals of the total output.

Table 5: Most productive 25 journals

S.No	Top 25 Journals	Publications	Percentage
1	Advanced Materials Research	59	2.28
2	Construction and Building Materials	51	1.97
3	Journal of Applied Polymer Science	45	1.74
4	Textile Outlook International	40	1.55
5	Fibre Chemistry	34	1.31
6	IOP Conference Series: Materials Science and Engineering	33	1.28
7	Applied Mechanics and Materials	28	1.08
8	Journal of Membrane Science	28	1.08
9	Textile Research Journal	25	0.97
10	Fibers and Polymers	24	0.93
11	Journal of the Textile Institute	22	0.85
12	Chemical Fibers International	21	0.81
13	Journal of Reinforced Plastics and Composites	20	0.77
14	Procedia Engineering	20	0.77
15	American Concrete Institute, ACI Special Publication	19	0.73
16	Colourage	18	0.7
17	International Journal of Applied Engineering Research	18	0.7
18	Fibres and Textiles in Eastern Europe	17	0.66
19	Journal of Fiber Science and Technology	16	0.62
20	Materials Science Forum	16	0.62
21	AIP Conference Proceedings	15	0.58
22	Materials Today: Proceedings	15	0.58
23	BioResources	14	0.54
24	International Fiber Journal	14	0.54
25	TMS Annual Meeting	14	0.54
26	Others	1960	75.79
	Total	2586	100

5. Conclusion

The study of synthetic fiber literature from the period 2008 to 2017 retrieved 2594 records. The study revealed that the growth trend of the literature gradually increased from 2012, except a sudden decline during the year 2010 and 2011. RGR found to decline in nature during the study period, The DT observed an increasing trend. Multi authored contribution are dominated in the field of Synthetic fiber Research. Author Monteiro, is the most prolific author, and contributed the highest no. of publications ie. 41 papers. The first three highly productive journals are Advanced material research with 59 publications, Construction and Building Materials journal contributed 51 publications and Journal of Applied Polymer Science published 45 papers. This scientometric study on synthetic fiber literature which provides an overall picture of the trends and productivity in the field of Synthetic fiber research. This analysis shows a tremendous growth in synthetic fiber research literature in a decade. It could be observed a growing tendency of collaborative nature of research in this field. The contemporary research direction in this study can be used to formulate policies to foster future research and development. It is desirable that government and other funding agencies should give high priority to research in this area. synthetic fiber has wide range of applications in different fields such as textile industry, automotive, engineering and aerospace industries in which the research in this field could further develop programmes which compliment expertise between theoretical, experimental and applications of synthetic fiber research.

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