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Leather Technology Research Output: A Scientometric Analysis on Web of Science Database(2009-2018)

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Abstract

The study analyses research publications in leather technology during 2009-2018. The data was obtained from Web of Science database. A total of 4027 records used for the present analysis were downloaded from the Web of Science database. The year wise distribution, authorship pattern, degree of collaboration, prolific author, prolific institute and productive journal were done as part of the present scientometric analysis.

Keywords: Leather Technology, Scientometrics, Web of Science, Growth pattern, Authorship pattern.

1. Introduction

Leather is a durable and flexible material produced by tanning of animal raw hides and skins. It is produced through various manufacturing processes from cottage industry to heavy industry. It is a non-woven material which is irreplaceable. This industry plays a highly prominent role in Indian economy in view of its contribution to exports, employment and economic development. Indian leather industry has attained global recognition in International markets and it occupies a high rank among the top seven foreign exchange earners of India. Today the share of the value added finished products in the total exports from Leather sector are 80%.

Scientometrics is a branch of science which analyses scientific publications in a particular discipline to explore the evolution, growth and pattern of development through quantitative measures of scientific information, like the number of papers published in a chosen period of time and their citation impact. In any discipline the researchers and research institutions are being evaluated based on their publications in peer reviewed journals. This involves measuring research output and its intellectual influence on the research community through measurement of publication's productive impact. Scientometric research contributes to the identification of scattering and growth of literature, author productivity and distribution of scientific literature by country, by institute, by language etc., which helps to monitor the growth and trends in research. AFJ Van Raan(1997) has stated that core areas of scientometrics are individual scientific documents, authors, scientific contributions, academic journals and regional aspects of science.

2. Review of Literature

Ulaganathan.G and Senthilkumar.R (2017) have analysed the publications in **Astrophysics** during the period 1989-2016. They found that the maximum publications with a count of 1179 were in the year 2016 & minimum publications with a count of 341 were in the year 1995. They enunciated that totally 17046 records were published during that period. With the help of scientometric indicators they evaluated the exponential growth rate as 0.961 for the research period. They calculated the top 20 cited reference and identified the top 20 institutions.

Janmajaya, M., et al.(2018) performed the scientometric study on **Neuro computing** during the period(1992-2018) with the help of the data obtained from Web of Science. They analysed the most contributed countries, the most published author, the top most institutions and collaborating authors. The data was visualised by the graphical mapping with the help of Citespace and VOS viewer. Neuro computing intellectual base was found with the help of statistical techniques. An intrinsic structure was produced by neuro computing publications.

Scientometric analysis was performed by Rajendran.P, Jeyashankar.R and Elango.B (2011) on the publications in Journal of Scientific and Industrial Research(**JSIR**) from 2005-2009. Sixty issues from five volumes were taken up for the study. The assessment was done on 633 research articles out of which 51 articles were single authored. The remaining were multi authored with weak degree of collaboration 0.92. The study revealed that average pages per publication was 6.27 and keywords per publication was 4.55. Most of the contributions i.e. 72.99% were done by Indian authors.

Karpagam et al. (2011) analysed the **Nano Science and Nano Technology** literature growth pattern in India for 20 years (1999-2009) using Scopus Database. They found out that 20.29% of contributions are from USA and it stands in the top position. China stands in the second position by publishing 15.87% articles and Japan stands third by publishing 10.39%. They also found that few countries have less productivity that is because many research articles were published in their own language.

Suresh.N and Thanuskodi.S (2019) have analysed 8576 Seed Technology publications during 2008-2017 retrieved from Scopus database. The study revealed that a linear growth pattern of literature is followed. The most contributing country is China, the Institution is Chinese Academy of Sciences, author is Wang.D. The research publication output for the year 2020 was predicted. The total citations received during the study period is 92782 and the average citation per paper is 10.81. Thanuskodi (2019) analyzed the research performance of individual scientists in ecology. The contribution of individual scientists varies. The highest number of papers is 15 by J.S. Singh.

3. Objective of the study

- I. To find out the Publication trend in Leather Technology during 2009-2018
- II. To evaluate the authorship pattern and degree of collaboration
- III. To probe the author wise publications
- IV. To explore the most prolific author, country, institute and the type of documents

4. Data collection and Research Methodology

Data for this analysis were retrieved from the Web of Science database for the period 2009-2018. The Keyword leather was used in the combined field of title, abstract and keywords for the search. The search was performed on 30/4/2019 to retrieve the data. In order to retrieve relevant data the search strategies were done diligently with absolute precision. A total of 4027 records were retrieved and it was exported to Microsoft Excel for analysis.

5. Methodology

To meet the objectives of the present study the data retrieved from web of science for the period 2009-2018 is being used as a source. All the required data like number of authors, number of papers, contributions from different institutes, countries, and journals were tabulated. According to the objectives of the study the data was analysed using Microsoft Excel. Degree of collaboration has been calculated using K. Subramaniam's (1983) formula in quantitative terms. All the data were subsequently examined, analysed and tabulated for making observations.

6. Data Analysis

6.1 Year wise distribution of publications

The total number of papers published during 2009 to 2018 in the field of leather Technology is 4027 as shown in Table 1.

Table 1 . Year wise distribution of publications

Sno.	Publication years	Publication count	Cumulative Publication	% of 4027	Cumulative % of 4027	Total citations	Average citations per paper
1	2009	337	337	8.37	8.37	70	0.21
2	2010	324	661	8.05	16.42	424	1.31
3	2011	394	1055	9.78	26.2	919	2.33
4	2012	400	1455	9.93	36.13	1428	3.57
5	2013	348	1803	8.64	44.77	2084	5.99
6	2014	368	2171	9.14	53.91	2490	6.77
7	2015	434	2605	10.78	64.69	3473	8.00
8	2016	462	3067	11.47	76.16	4394	9.51
9	2017	486	3553	12.07	88.23	4995	10.28
10	2018	474	4027	11.77	100	6561	13.84
Total		4027				26838	

The yearwise analysis shows that an average of 403 publications were published in a year. The highest number of 486(12.07%) publications were published in the year 2017, followed by 474(11.77%) in 2018 and 462(11.47%) in 2016 during the period of the study. The significant increase in the yearly output and citations in the field of leather technology research shows it has received more attention throughout the world.

The growth trend of publications is presented in Figure 1

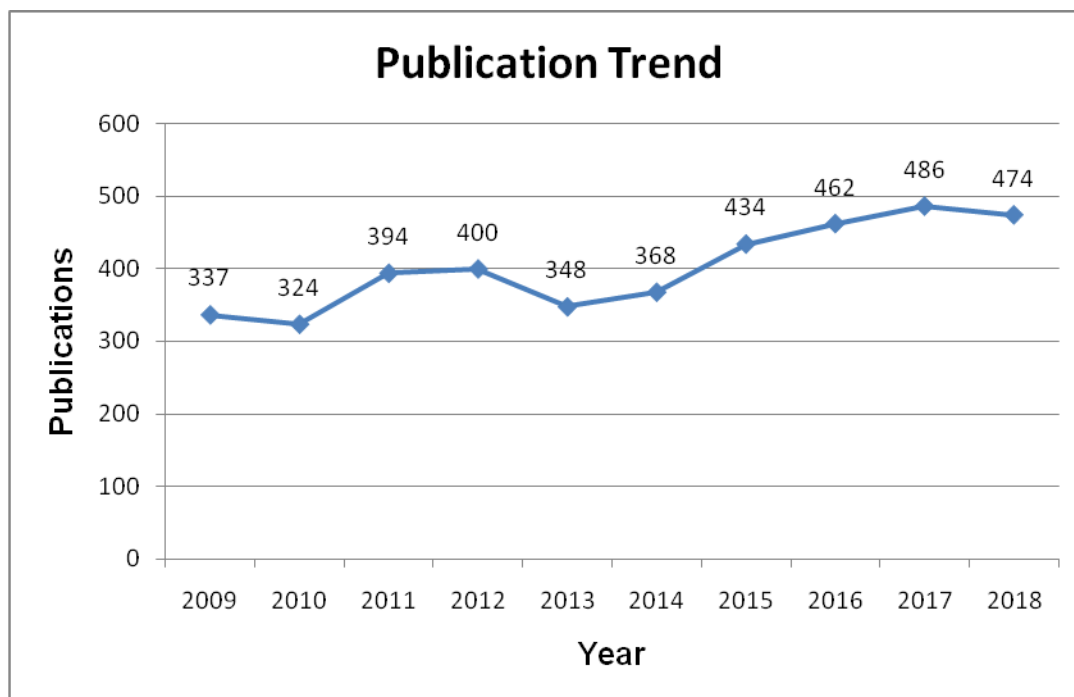


Figure 1. Growth trend of publications in Leather Technology during 2009-2018

6.2 Authorship Pattern and Degree of Collaboration

Table 2 shows the authorship pattern in leather technology. Out of 4027 articles, 329(8.17%) were contributed by single authors and the remaining 3698(91.8%) were contributed by joint authors. It was found that the maximum research articles were published collaboratively.

Table 2. Authorship Pattern

Authorship Pattern	Years										No. of publications	% of Articles
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		
1	38	31	40	35	36	24	31	36	31	27	329	8.17
2	51	62	62	50	42	48	52	44	67	61	539	13.38
3	60	76	96	83	68	85	94	95	90	86	833	20.69
4	81	67	83	88	75	77	86	107	105	97	866	21.50
5	49	45	53	71	58	56	80	72	83	81	648	16.09
6	35	21	35	35	28	36	51	47	51	56	395	9.81
7	9	13	17	20	20	15	21	24	28	33	200	4.97
8	5	5	5	12	10	11	6	18	13	15	100	2.48

9	5	4	0	4	3	7	9	9	7	7	55	1.37
>10	4	0	3	2	8	9	4	10	11	11	62	1.54
Total Articles	337	324	394	400	348	368	434	462	486	474	4027	100

Degree of collaboration (DC) determines the extent of collaboration in a research field. DC is the ratio of the number of multi authored papers to the total number of research papers in that discipline during a given period of time. It is calculated using K.Subramanyam's(1983) formula given below

$$DC = \frac{Nm}{Nm + Ns}$$

Where DC is the degree of collaboration, Nm is the Number of multi authored papers published during a year and Ns is the Number of single authored papers published during a year. The DC in this study was 0.92. The Degree of collaboration is presented in Table 4. The highest value for degree of collaboration 0.94 was found in the year 2017 and 2018. The lowest value 0.89 and it was in the year 2009. The overall value of Degree of collaboration was 0.92 during the study period. This indicates that team research is high in the field of leather technology.

Table 3. Degree of Collaboration

Year	Single Author (Ns)	Multi Author (Nm)	Total = Nm+Ns	Degree of collaboration(DC)
2009	38	299	337	0.89
2010	31	293	324	0.90
2011	40	354	394	0.90
2012	35	365	400	0.91
2013	36	312	348	0.90
2014	24	344	368	0.93
2015	31	403	434	0.93
2016	36	426	462	0.92
2017	31	455	486	0.94
2018	27	447	474	0.94
Total	329	3698	4027	0.92

6.3 Author wise Publications

During the study period 10103 authors have published and the top 10 prolific authors are given in Table 4 and Figure 2. The top ten authors published between 39 and 92 papers during the study period. Based on publications Rao JR was the most productive author with 92 publications, followed by Ma JZ with 58 publications and Shi B with 53 publications. Based on Citations the authors were ranked on the number of citations, Gutterres M ranked first with 498 citations, followed by Mandal AB with 444 citations and Rao JR with 412 citations. The authors were ranked based on H index which is a robust measure of productivity. Gutterres M ranked first with 14, followed by Mandal AB with 13 and Rao JR with 10.

Table 4. Top 10 prolific authors in leather research during 2009-2018 and their particulars

Sno.	Author	No. of publication	H Index	Average citations per item	Total citations
1	Rao JR	92	10	4.48	412
2	Ma JZ	58	7	5.55	172
3	Shi B	53	9	5.19	275
4	Bacardit A	52	5	2.69	140
5	Gutterres M	50	14	9.96	498
6	Olle L	48	5	2.65	127
7	Wang XC	46	6	1.83	84
8	Liu CK	41	7	3.41	140
9	Nair BU	40	8	5.15	206
10	Mandal AB	39	13	11.38	444

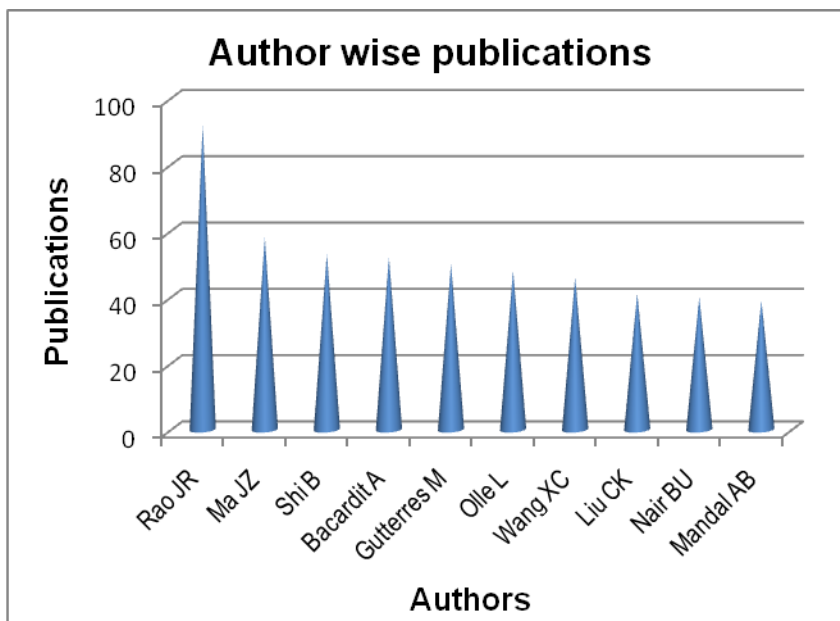


Figure 2. Top 10 prolific authors in leather research during 2009-2018

6.4 Country wise distribution

Out of 81 countries contributed, the top 10 countries with more number of publications are shown in Table 5. Among the countries, the most productive country is Peoples republic of China with 802(19.91%), India with 579 (14.37%) stands in the second place followed by United States of America with 339(8.41%).

Table 5. Country wise publications

Sno	Country	Publications	% of 4027
1	Peoples Republic of China	802	19.91
2	India	579	14.37
3	United States of America	339	8.41
4	Brazil	241	5.98
5	Turkey	223	5.53
6	Spain	211	5.24
7	Romania	208	5.16
8	Italy	189	4.69
9	Germany	136	3.37
10	England	128	3.17

The top 10 productive countries in leather research are presented in Figure 2.

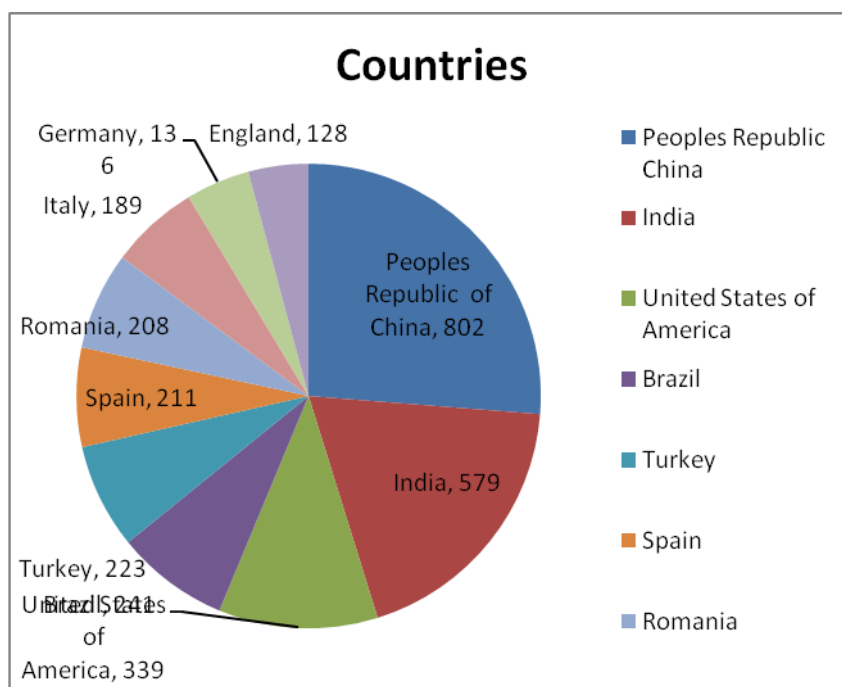


Figure 2. Top 10 productive countries in leather research during 2009-2018

6.5 Productive Journals

The top ten journals which had published the most number of papers in leather research during 2009–2018 are listed in Table 7. Ten journals published 20 or more publications and these journals published 33% of all papers. About 45% of all citations were received by the papers published in the top ten journals. In terms of publications Journal of the American Leather Chemist association ranked first with 383 publications followed by Journal of the society of leather technologist and chemists ranked second with 324 publications and journal of cleaner production took the third position with 102 publications. In terms of H-index, Journal of hazardous materials ranks first with 24, journal of cleaner production stands second with 21 and Journal of the American Leather chemists association stands third with 12. In terms of citations, Journal of hazardous materials ranks first with 1993 citations.

Sno.	Journal/Source Titles	Total Publications	H index	Average Citations	Total Citations
1	Journal of the american leather chemists association	383	12	3	1150
2	Journal of the society of leather technologists and chemists	324	8	1.7	554
3	Journal of cleaner production	102	21	13.3	1355
4	Advanced materials research	75	4	0.9	67
5	Journal of hazardous materials	45	24	44.3	1993
6	Journal of applied polymer science	44	11	7.4	326
7	XXX congress of the international union of leather technologists chemists societies proceedings	37	1	0.14	5
8	Rsc advances	34	9	6.03	211
9	Revista de chimie	31	6	4.23	131
10	Desalination and water treatment	30	6	4.7	141

6.6 Most productive Institution

Out of 3022 institutions contributed, the top 10 institutions were taken for analysis. Table 5 shows the most productive institutions, Council of Scientific Industrial Research CSIR, India has contributed 341(0.08%) research publications and occupied the first position. Central Leather Research Institute, India has contributed 290(0.07%) research publications and occupied the second position. Sichuan University contributed 204(0.05%) research publications and occupied the third position.

Table 5. Most productive Institution

Sno.	Organisations	Total Publications	Total Publications (% of 4027)
1	Council of scientific industrial research CSIR India	341	8%
2	Central leather research institute India	290	7%
3	Sichuan university	204	5%
4	Shaanxi university of science technology	182	4%
5	National research development institute textiles leather incdtp	117	3%
6	Ege university	112	3%
7	Polytechnic university of catalonia	69	2%
8	Universidade federal do riogrande do sul	68	2%
9	United states department of agriculture Usda	65	2%
10	Polytechnic university of bucharest	57	1%

7. Findings

- During the study period all the papers were published in English only. 4027 papers were published during these ten years. An average of 403 papers were published per year.
- The most productive countries are Peoples Republic of China and India.
- The overall degree of collaboration is found to be 0.92. Multi author productivity is more when compared to single author.
- The top most contributing research institution is from India, Council of Scientific and Industrial Research - Central Leather Research institute.
- Leather technology research output is published in renowned journals with high H-index. The average H index of the top ten productive journals in leather technology research is 10.2.

8. Conclusion

The results of the present study on leather research output during 2009–2018 based on web of science explored key characteristics such as: growth rate of research, authorship pattern, most publishing countries, institutes, authors and journals. The annual number of papers published have been increased tremendously from 337 in 2009 to 474 in 2018. CSIR-CLRI published most of the papers in the field of leather during the study period. The scientometric study shows a growing trend in the field of leather publications during the last decade. The results showed a high level of team work as most of the publications are produced jointly. On the whole the study gives a clear picture of research productivity and citation impact of authors in the field of leather. The results of the study will help the researchers to understand the research pattern and trends in this field and to perform the future research.

References

- Janmajaya, M., Shukla, A., Abraham, A., & Muhuri, P. (2018). A Scientometric Study of Neurocomputing Publications (1992–2018): An Aerial Overview of Intrinsic Structure. *Publications*, 6(32), 1 - 22.
- Karpagam, R., Gopalakrishnan, S., Natarajan, M., & Babu, B. R. (2011). Mapping of nanoscience and nanotechnology research in India: a scientometric analysis, 1990–2009. *Scientometrics*, 89(2), 501 - 522.
- Rajendran, P., Jeysankar, R., & Elango, B. (2011). Scientometric analysis of contributions to journal of scientific and industrial research. *International Journal of Digital Library Services*, 1(2), 79-89.
- Subramanyam, K. (1983). Bibliometric study of research collaboration : A review. *J. Info.Sci.*, 6, 33-38.
- Suresh, N., & Thanuskodi, S. (2019). Seed Technology Research Output: A Scientometric Analysis on SCOPUS Database. *Library Philosophy and Practice*, 1 - 15.

Thanuskodi, S. and Venkatalakshmi, V. (2010). The Growth and Development of Research on Ecology in India: A Bibliometric Study. *Library Philosophy and Practice* .Paper 359.

Ulaganathan, G., &Senthilkumar, R. (2017).Scientometric Analysis of Astrophysics Research Output in India: A Study Based on Web of Science Database. *Journal of Advances in Library and Information Science*, 6(4), 324 - 328.

Van Raan, A.F.J. 1997. Scientometrics: State-of-the-art. *Scientometrics*, 38(1), 205 –218