A SCIENTOMETRIC ANALYSIS OF LITERATURE PUBLISHED IN INTERNATIONAL JOURNAL OF MECHANICS AND MATERIALS IN DESIGN

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Abstract:

This paper presents a Scientometric analysis of International Journal of Mechanics and Materials in Design from the BAMU, Chhatrapati Sambhaji Nagar. The research article was published during the year 2014-2018. However, the data was collected and indexed in SpringerLink were considered for the analysis included a total of 170 publications. The other aspects that were identified in the paper were the most prolific authors, collaborative authorship patterns and trends, most preferred publications, etc.

Keywords: Scientometric**,** International Journal of Mechanics and Materials in Design, Finite element method, Engineering, SpringerLink, Literature, Buckling, Carbon nanotubes, etc.

Introduction:

The International Journal of Mechanics and Materials in Design features recent advances and original works in mechanics and materials engineering and their impact on the design process. The journal enables mechanical, aeronautical, civil, automotive, biomedical, chemical, and nuclear engineers as well as other researchers and scientists to stay abreast of the latest developments. Moreover, it enables them to exchange ideas concerning the use of mechanics and materials in design. Among the topics readers will discover are intelligent design, advanced materials in design, design analysis and optimization, experimental mechanics in design, and design case studies. These topics and more are explored in an integrated, highly focused and coherent format.

Scientometrics is the study of measuring and analysing science, technology and innovation. It is Quantitative study of science and technology and it is field within bibliometrics that quantifies and encompasses evaluation and assessment of scholarly content within the field of science.

Review of literature:

Tayade. S. M., Khaparde V .S, Ambhore .S. P. (2015) this study attempts on the Scientometric analysis of International Journal Library Quarterly. It is based on the references appended to International Journal of "Library Quarterly" during 2008-2012. The present study

is based on 2844 references appended to 86 articles contributed by the authors in Library Quarterly. It was found that journals citations are more in number than the other citations. In authorship pattern it was found that solo research is predominant then collaborative research. The degree of collaboration was calculated & it was found that the single authorship trend is increasing.

Alhamdi .F.A., Khaparde .V .S and Wankhede R. S. (2014) the present study deals a Scientometric analysis of 56 papers published in the Library and Information science & Technical Abstract (LISTA) on internet use in the subject of library &Information science during the period 2004 - 2013. The study focused on various aspects: such as document types, growth Rate (GR) and doubling time (DT) of publications and citations, year-wise, authorship pattern, institutions involved, most prolific authors of the journal. The study revealed that most of the papers (71.4%) of papers were contributed by multiple authors. USA is the top producing country with 8 (14.3%) publications of the total output. The mean doubling time for the first five years (i.e. 2004 to 2008) is only (1.05) which is increased to (6.07) during the last five years (2009 to 2013). Maximum 35 (62.5%) out of 56 of the authors are not mentioned their email address in the paper.

Waghmare .P. S., Khaparde .V .S (2016) the present study attempts on the Scientometric analysis of Journal Collection Building. It is based on the references appended to International Journal of "Collection building" during 2010-2014. The present study is based on 1665 references appended to 105 articles contributed by the authors in Collection Building. It was found that journals citations are more in number than the other citations. In authorship pattern it was found that solo research is predominant then collaborative research. The study shows the period of Collection building is 5 years approximately.

About the database springerlink:

SpringerLink is an online collection of over 1,200 peer-reviewed journals and 25 book series published by Springer covering a variety of topics in the sciences, social sciences, and humanities. SpringerLink contains citation and abstract information back to volume 1, issue 1 for most titles (Springer is in the process of digitally converting the back issues of all its titles). In most cases, full-text access, based on individual or institutional subscriptions, is available back to 1996 for each "current" journal title subscription. For earlier coverage, subscribers must purchase the historical archive (1843-1996) at additional cost. SpringerLink is also the gateway for accessing the products Landolt-Börnstein, Springer eBooks collection, and Springer reference works.

Objective of the study:

1. To study the year-wise distribution of publishing and citation.
2. To study the growth Rate (GR) and doubling time (DT) of publications
3. To find out the authorship and degree of collaboration pattern in the publication
4. To identify the mail domain of contributors.
5. To identify the length of title and pages.
6. To find out organization-wise distribution of publication.

7. To find out country-wise distribution of publication.

Scope and methodology:

This study tries to present the literature growth, authorship and collaboration pattern, average length of articles and average keywords in the source journal. The data has been collected and analyzed in MS-Excel, collected from Springer Link from 2014 to 2018 containing 20 issues and 170 articles.

Table No 01.Year Wise Distribution of Papers:

Sr. No.	Year	Frequency	Percentage
1	2014	28	16.47
2	2015	31	18.24
3	2016	36	21.18
4	2017	34	20.00
5	2018	41	24.12
Total		**170**	**100.00**

Fig. No.01 Year wise distribution of papers

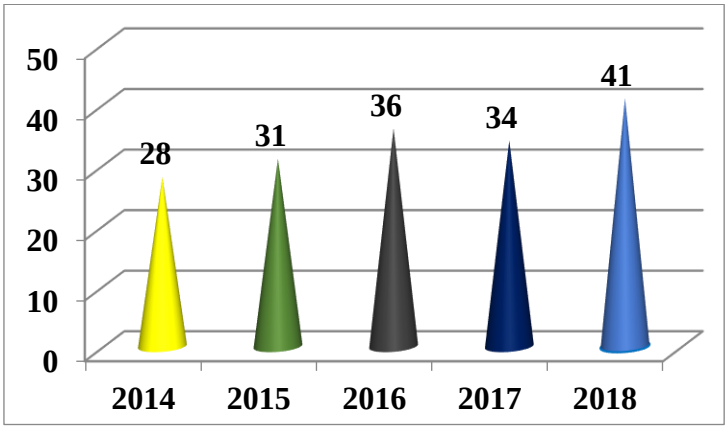


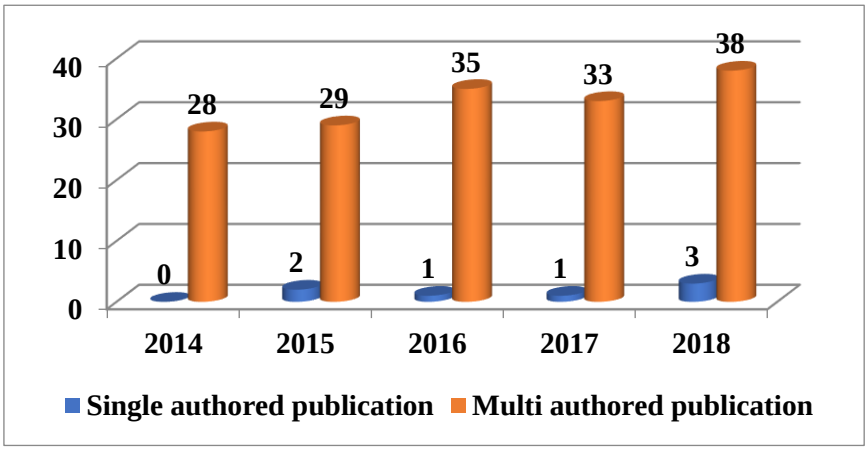
Table No. 1 and fig. No. 1 shows the year-wise distribution of papers International Journal of Mechanics and Materials in Design, Springer Link during 2014 to 2018. The highest numbers of papers were published in the year of 2018 contributing 41(24.12%) papers, below that 2016 36(21.18%) papers, followed by 34(20.00%) in 2017, 2015 31(18.24%) and the last and the lowest one 2014 with 28(16.47%) papers.

Table No. 02 Year-Wise Publication Productivity and Collaboration Rate

Year	Single authored publication	Multi-authored publication	Total no. of publication	Collaboration Rate
2014	0	28	28	**5.82**
2015	2	29	31	**5.26**
2016	1	35	36	**4.53**
2017	1	33	34	**4.79**

2018	3	38	41	**3.98**
Total	**7**	**163**	**170**	**0.96**

Fig no. 02 Year - Wise Publication Productivity and Collaboration Rate

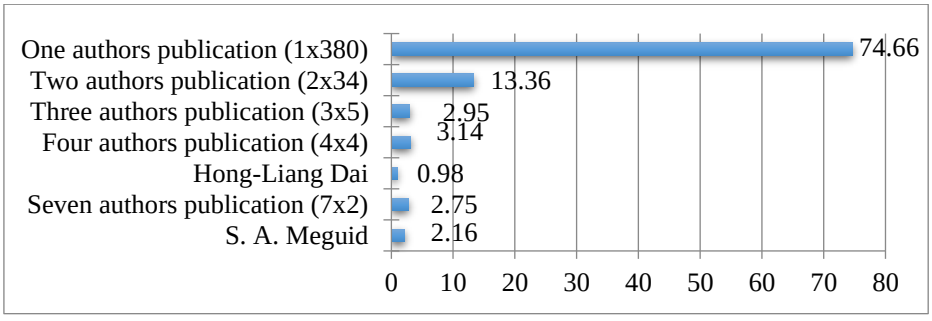


I t can be observed from Table No. 02 & figure No. 02 that during the periods 2014-2018 a total of 170 Article were published in the International Journal of Mechanics and Materials in Design by researchers in various countries. Majority of the contributions were contributed in year 2018 with 38 contributions were contributed in years 2014 with same contributions 28 contributions.

Table -3 Most Productive Author

Sr. No	Authors	Total	Percentage
1	S. A. Meguid	11	2.16
2	Dan Zhang	7	1.38
3	M. C. Ray	7	1.38
4	Hong-Liang Dai	5	0.98
5	Four authors publication (4x4)	16	3.14
6	Three authors publication (3x5)	15	2.95
7	Two authors publication (2x34)	68	13.36
8	One authors publication (1x380)	380	74.66
Total		**509**	**100**

Fig -3 Most Productive Author



It can be observed from Table-3 and fig. no.3 that, the most productive authors are S. A. Meguid who had contributed 11(2.16%) papers. And this followed by Dan Zhang & M. C. Ray, each contributed 7(1.38%) papers. The rest 380 (74.66 %) authors each published one article.

Table No-4 Institute-Wise Distribution of Articles Published

Sr. No.	Institutes	Total	Percentage
1	Department of Mechanical Engineering Indian Institute of Technology Kharagpur India	12	2.36
2	Mechanics and Aerospace Design Laboratory University of TorontoToronto Canada	12	2.36
			Table No-4 conti….
3	Faculty of Mechanical Engineering University of Kashan Kashan Iran	10	1.96
4	Institute of Structural Mechanics Bauhaus-University Weimar Weimar Germany	10	1.96
5	Department of Mechanical Engineering University of Manitoba Winnipeg Canada	8	1.57
6	Mechanics and Aerospace Design Laboratory, Department of Mechanical and Industrial Engineering University of Toronto Toronto Canada	8	1.57
7	Department of Materials Processing, Graduate School of Engineering Tohoku University Sendai Japan	7	1.38
8	State Key Laboratory of Mechanical System and Vibration Shanghai Jiao Tong University Shanghai China	7	1.38
9	Six institutes publication (6x5)	30	5.89
10	Five institutes publication (5x3)	15	2.95
11	Four institutes publication (4x13)	52	10.22
12	Three institutes publication (3x40)	120	23.58
13	Two institutes publication (2x54)	108	21.22
14	Single institute publication (1x110)	110	21.61
Total		**509**	**100**

It can be observed from table No. 4 that, there were 509 organizations involved in research activity during 2014 to 2018. Out of 509 institutions there is some top most contribution which are 2 institutions with 12 publications each after that 2 institution with 10 publications each, followed by 2 institutions with 8 publications each.

Table 5: Country-Wise Distribution of Articles

Sr. No.	Country	Total	Percentage
1	China	113	22.2
2	Iran	62	12.18
3	India	60	11.79

4	Canada	50	9.82
5	Japan	27	5.3
6	Australia	23	4.52
7	USA	20	3.93
8	Germany	16	3.14
9	Egypt	13	2.55
10	Others	125	24.56
Total		**509**	**100**

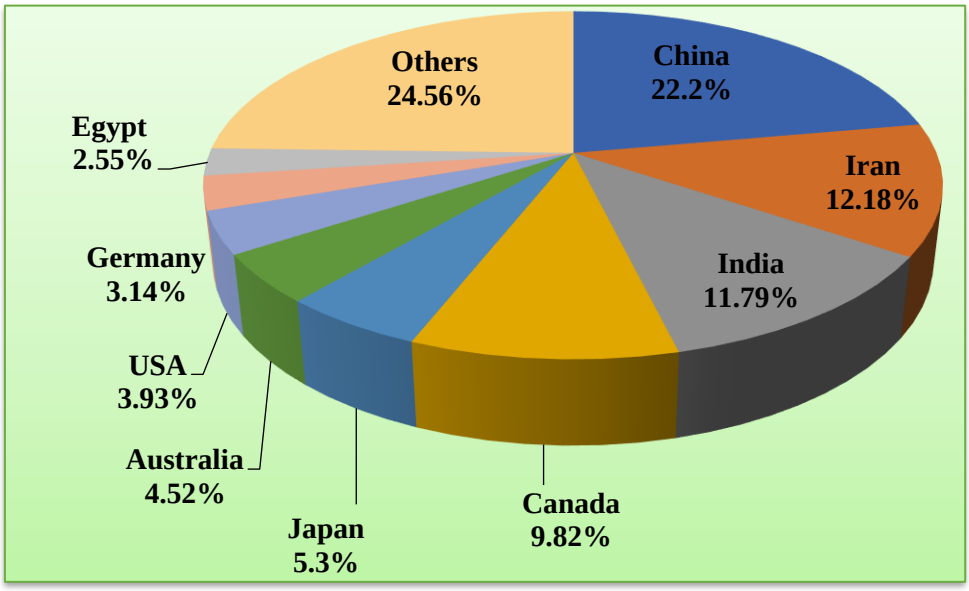


Fig no. 3: Country-Wise Distribution of Articles

It can be observed from Table No 5 and Fig No. 3 that, there were as many as 509 countries carrying out research and produced 170 articles. Table no.5 provides ranked List of countries contributing to this field, the number of publications of each country and their share in percentages. China is the top producing country with 113 (22.2%) publications of the total output. Also it can be stated that papers not mentioned their country of publication are more than other countries in this study.

Relative Growth Rate [r (a)] And Doubling Time [dt (a)] For Publications

Relative growth rate (RGR):

The Relative Growth Rate (RGR) is the increase in number of articles/ pages per unit of time. This definition is derivedfrom the definition of relative growth rates in the study of growth analysis of individual plants and effectively applied in the field of Botany Hunt (1919), Blackman (1919) defined which in turn had its origin from the study of the rate of interest in the financial investment. The mean Relative Growth rate (R) over the specific period of interval can be calculated from the following equation.

R

1-2 = Loge 2 W -loge IW

Whereas,1-2 R = mean relative growth rate over the specific period of interval.

LogeIW = log of initial number of Articles.

Loge 2 W = log of final number of articles after a specific period of interval.

2 T -1 T = the unit difference between the initial time and final time.

The year can be taken here as the unit of time. The RGR for articles is hereby circulated.

Therefore,

1-2 (aa-1 year-1) can represent the mean relative growth rate per unit of year over a specificperiod of interval.

Doubling time (Dt) :

There exists a direct equivalence between the relative growth rate and the doubling time. If the numbers of articles/pages of subject double during a given period then the difference the logarithms of numbers at the beginning and end of this period must belogarithms of number

2. If natural logarithm is used this difference has a value of 0.693. Thus the corresponding doubling time for each specific period of interval and for both articles and pages can be calculated by the formula,
Doubling time (Dt) = 0.693/ R (A)
Therefore,
Doubling time for articles D(t) = 0.693/1-2 R (aa-1 year-1)

Table No. 06: Relative Growth Rate and Doubling Time of Publication

Year	No of Articles	Cumulative Frequency	W1	W2	RGR	Mean[R(A)]	DT(A)	Mean DT(A)
2014	28	28		3.33				
2015	31	59	3.33	4.07	0.7		0.94	
2016	36	95	4.07	4.55	0.5	0.36	1.44	1.438
2017	34	129	4.55	4.85	0.3		2.31	
2018	41	170	4.85	5.13	0.3		2.5	

From the table no.07 no, it noticed that the mean relative growth for the first five years 2014 to 2018 is (0.36). While the Doubling time for different years [DT (A)] gradually increased. Mean (Dt) is 1.438. Thus as the rate of growth of publication was decreased, the corresponding Doubling Time was increased.

Table No.7: Keywords

Sr.No	Keywords	Total	Percentage
1	Finite element method	9	1.06
2	Functionally graded materials	8	0.94

3	Finite element analysis	7	0.82
4	Finite element	7	0.82
		Table No.7 conti…..	
5	Buckling	6	0.70
6	Carbon nanotubes	6	0.70
7	Nanobeams	6	0.70
8	Residual stress	6	0.70
9	Vibration	6	0.70
10	Modified couple-stress theory	5	0.59
11	Nonlocal elasticity	5	0.59
12	Four keywords publication (4x6)	24	2.82
13	Three keywords publication (3x18)	54	6.34
14	Two keywords publication (2x58)	116	13.62
15	Single keyword publication (1x587)	587	68.90
Total		**852**	**100.00**

It can be observed from Table No. 7 that, the high frequency keywords were 'Finite element method' with 9(1.06%), Functionally graded materials with 8(0.94), Finite element analysis 7(0.82), Table gives a list of keywords appeared in the articles during the period of the study.

Findings and conclusion:

1. The highest numbers 41 (24.12%) of papers were published in 2018.
2. More than three-fourth 380(74.66%) of papers were contributed by single author.
3. Most productive authors are S. A. Meguid with contribution of 11(2.16%) publications each.
4. Out of 509 institutions there are 2 most productive institutions with 12 publications each.
5. China is the top producing country with 113 (22.2%) publications of the total output..
6. The highest frequency keywords were Finite element method with 9 (1.06%).
7. All the 170 articles are in article document type format.

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