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CLAY RESEARCH – A BIBLIOMETRIC STUDY

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CLAY RESEARCH – A BIBLIOMETRIC STUDY

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Abstract: *Bibliometric* techniques were applied to analyze the authorship trend in the “Clay Research” during the period of 2007-2016. A total of 83 articles and 303 authors in the journal were examined by research article contributions by year and issue, authorship patterns by year and volume, authorship patterns, author’s productivity, most prolific authors, ranking by authors, contribution by institutions, authorship by country and degree of author collaboration. The average number of authors per paper is 3.650 and the average productivity per author is 0.273. The average degree of author collaboration is 0.891 during the period under study. The majority 294(97.029%) of the papers have been written in joint authorship.

Key Words: Bibliometric; Publication Analysis; Authorship Patterns; Degree of Collaboration; Research Trends; Clay Research.

INTRODUCTION

Clay Research is the official publication of the Clay Minerals Society of India and is published twice a year, in June and December. The Journal undertakes to publish articles of interest to the international community of clay scientists, and will cover the subject areas of mineralogy, geology and geochemistry, crystallography, physical and colloid chemistry, physics, ceramics, civil and petroleum engineering and soil science. The Journal is reviewed in Chemical Abstracts, Mineralogical Abstracts, and Soils and Fertilizers. The Clay Minerals Society of India (CMSI) is a premier professional registered society formed to serve as a nerve centre for Scientists, Industrialists, Technologists and others to meet and foster the advancement in the field of clay mineralogy and industry. It was founded in 1981, in the premises of IARI, New Delhi.

The CMSI is an interdisciplinary society with members from Soil Science, Geology, Basic Sciences, Agriculture, Engineering, Ceramics, Petrochemical, and host of other related disciplines. The journal is indexed with: Indexed/Abstracted Indian Science Abstract, SCOPUS, National Academy of Agricultural Sciences(NAAS), 2018 - 2.97, Indian Citation Index – Research Impact Indicator: 0.2, Google Scholar, CNKI Scholar, EBSCO Discovery and Summon(ProQuest).

LITERATURE REVIEW

Thavamani, (2018) analyzed the various components of the articles published in the *Astrobiology* from 2010 – 2016. A total of 519 articles and 3048 authors in the journal were examined. The average degree of collaboration is 0.861, which clearly indicates its dominance upon multi authored contributions. Thavamani, (2017) analyzed the various components of the articles published in the *Journal of Biofuels* from 2010 – 2016. Various quality aspects of the 106 research articles and 376 authors were examined.

Thavamani, (2015) studied of Collaborative Librarianship (CL) during the period of 2009-2014. A total of 223 research contributions and 343 authors were examined. Thavamani, (2014) studied the authorship trend in the “Chinese Librarianship: an International Electronic Journal (CLIEJ)” during the period of 1996-2013. A total of 133 articles and 221 authors in the Journal were examined by year and volume to ascertain authorship patterns, author productivity, and degree of collaboration.

Thavamani, (2014) analyzed the *Malaysian Journal of Library and Information Science*. A total of 279 research articles and 575 authors were examined by growth of contributions by year and volume, authorship patterns by year and volume, authorship patterns, author productivity, single and multi authored papers by year, authorship patterns by global, most prolific contributors and degree of collaboration.

Thavamani, (2013) identified the growth and authorship pattern of productivity of articles of source journal "DESIDOC Journal of Library & Information Technology". It was observed from the study that the year 2008 was most participating year during the study period 2007 - 2011. Amsaveni and Vasanthi (2013) traced the trend in authorship patterns and collaborative research in network security.

Mahapatra and Padmanav (2006) growth of scientific research literature of authorship patterns, year wise growth, subject wise break up of papers, category of journals, place of origin, length of papers, and productivity of journals were studied. Nosheen Fatima Warraich and Sajjad Ahmad (2011) trace the author productivity, extent of authors' collaboration, authors' institutional affiliation, authors' geographic affiliation, type of publication, language of papers, number of citations used per article, length of papers, and year wise distribution of papers.

Thavamani and Velmurugan (2013) examined the patterns of authorship and degree of collaboration in the *Annals of Library and Information Studies* during 2002-2012. Neerja Verma, Rajnish Tamrakar and Priyanka Sharma. (2007) find out the year wise, institutions wise, state wise distribution of contributions, authorship patterns, citation analysis, and length of the contributions. Vimala and Pulla Reddy (2009) traced authorship patterns and collaborative research in theses on zoology.

Zafrunnisha and Pulla Reddy (2009) studied authorship trend and collaborative research in the field of Psychology. Vinayagamorthy, Chellappandi and Shanthi (2009) found that increasing trend of literature, authorship patterns and single authored articles in herbal literature. Esmail Mohamed., Nagarajan and Jothi (2011) discussed authorship trend and collaborative research in the field of agricultural extension.

OBJECTIVES OF THE STUDY

The objectives of the present study are as follows:

1. To study contribution of research articles by year and issue
2. To study Authorship patterns by year and volume
3. To study authorship patterns
4. To study authors productivity
5. To study most prolific authors
6. To study ranking by authors
7. To study contribution by institutions
8. To study authorship by country and
9. To identify degree of author collaboration

METHODOLOGY AND DATA COLLECTION

The data was collected from the website (www.indianjournals.com) of the Clay Research twenty (20) issues from ten (10) volumes from 2007 to 2016 have been selected for the study. Research article contributions by year and issue, authorship patterns by year and volume, authorship patterns, author's productivity, most prolific authors, ranking by authors, contribution by institutions, authorship by country and degree of author collaboration were recorded. All articles are source article published in the last ten years (2007 – 2016) were recorded in a separate white sheet and results were entered in Microsoft Excel. Statistical Package for Social Sciences (SPSS) was used for the analysis. These data were organized, calculated, tabulated, analyzed, and presented by using simple arithmetic and statistical methods in order to provide analysis.

DATA ANALYSIS AND FINDINGS

Data on the bibliographic records were collected from the online version of the Clay Research pertaining to the period 2007 – 2016. A total of 83 contributions and 303 authors were analyzed the journal. The flowing tables and brief analyses represent the substance of this research.

Table 1: Research Articles by Year and Issue

Sl. No.	Year/ Issues	No. of Articles	Percentage (%)
1	2007/2	5	6.024

2	2008/2	5	6.024
3	2009/2	7	8.433
4	2010/2	5	6.024
5	2011/2	10	12.048
6	2012/2	10	12.048
7	2013/2	11	13.253
8	2014/2	10	12.048
9	2015/2	10	12.048
10	2016/2	10	12.048
Total		83	100

Table 1 show the growth of research articles published in the Clay Research from 2007 to 2016. Altogether, there are 83 research articles. The highest number of research articles 11(13.253%) was published in 2013, while the lowest number 5(6.024%) of research articles were published in the years of 2007, 2008 and 2010.

Table 2: Authorship Patterns by Year and Volume

Sl. No.	Year	Volume	Authors per Article										Total No. of Papers (%)	Total No. of Authors (%)
			1	2	3	4	5	6	7	10	12	13		
1	2007	26	--	1	3	1	--	--	--	--	--	--	5(6.024)	15(4.950)
2	2008	27	2	2	1	--	--	--	--	--	--	--	5(6.024)	9(2.970)
3	2009	28	--	5	1	1	--	--	--	--	--	--	7(8.433)	17(5.610)
4	2010	29	1	1	1	--	2	--	--	--	--	--	5(6.024)	16(5.280)
5	2011	30	--	2	2	2	3	1	--	--	--	--	10(12.048)	39(12.871)
6	2012	31	2	--	3	2	3	--	--	--	--	--	10(12.048)	34(11.221)
7	2013	32	1	2	2	1	2	1	1	--	--	1	11(13.253)	51(16.831)
8	2014	33	2	2	3	2	--	1	--	--	--	--	10(12.048)	29(9.570)
9	2015	34	--	--	4	3	1	1	--	--	1	--	10(12.048)	47(15.511)
10	2016	35	1	1	1	2	2	2	--	1	--	--	10(12.048)	46(15.181)
		Total	9	16	21	14	13	6	1	1	1	1	83(100)	303(100)

Table 2 shows the authorship patterns by year and volume. Out of the 9 contributions by single author, volume 27, 30 and 33 has the highest number i.e., 2(29.577%) volume 29, 32 and 35 has the lowest number i.e. 1(11.111%) contributions. Out of the 16 contributions by two authors, volume 28 has the highest i.e. 5(31.25%). And volume 26, 29 and 35 has the lowest number i.e., 1(6.25%) contributions. Out of 21 contributions by three authors, volume 34 has the highest i.e. 4(19.047%) and 27, 28, 29 and 35 has the lowest number i.e., 1(4.761%) contributions.

Out of 14 research articles contributed by four authors, volume 34 has the highest i.e. 3(21.428%) while volume 26, 29 and 32 has the lowest number i.e. 1(7.142%). Of the 13 research articles contributed by five authors, volumes 30 and 31 have the highest number i.e. 3(23.076%) while volume 34 has the lowest number i.e. 1(7.692%).

Of the 6 research articles contributed by six authors, volume 35 has the highest number i.e. 2(33.333%) while volume 30, 32, 33 and 34 has the lowest number i.e. 1(16.666%). Of the 1 research articles contributed by seven authors, volumes 32 have the 1. And of the 1 research articles contributed by 10 authors (vol.35), 12 authors (vol.34) and 13 authors (vol.32).

Table 3: Authorship Patterns

Sl. No.	Author	Total	Percentage (%)
1	Single Author	9	10.843
2	Two Authors	16	19.277
3	Three Authors	21	25.301
4	Four Authors	14	16.867
5	Five Authors	13	15.662
6	Six Authors	6	7.228
7	Seven Authors	1	1.204
8	Ten Authors	1	1.204
9	Twelve Authors	1	1.204
10	Thirteen Authors	1	1.204
Total		83	100

Graph 1: Authorship Patterns

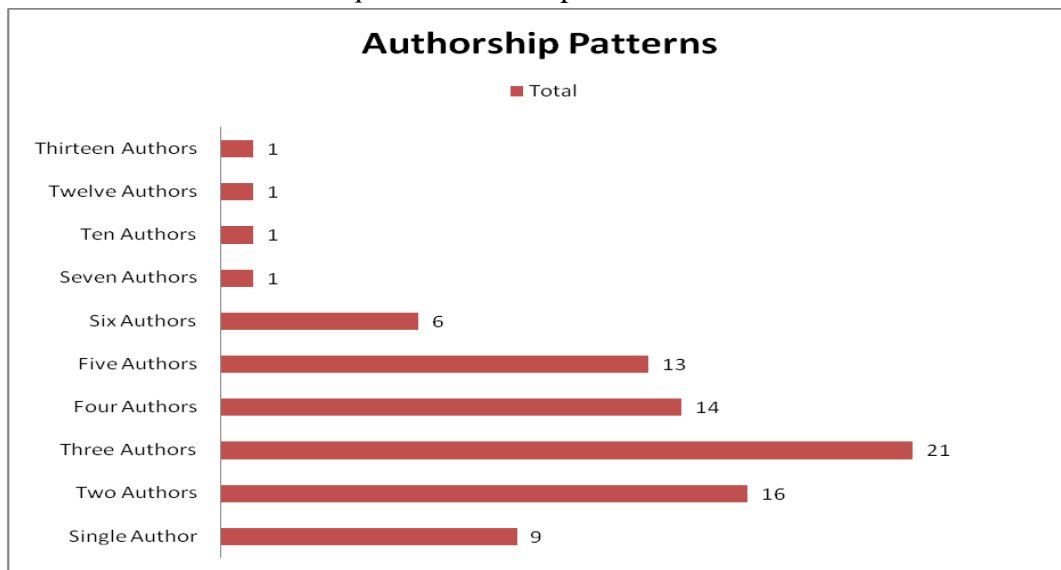


Table 3 and Graph 1 shows the majority 74(89.156%) of the papers have been written in joint authorship. It is seen that only 9(10.843%) of the publications were single authored articles. Followed by two authors 16(19.277%), three authors 21(25.301%), four authors 14(16.867%), five authors 13(15.662%), six authors 6(7.228%). The lowest number of contributions was made by seven, ten, twelve, and thirteen authors 1(1.204%).

Table 4: Author's Productivity

Sl. No.	Year	Total No. of Papers	Total No. of Authors	AAPP*	Productivity per Author
1	2007	5	15	3	0.333
2	2008	5	9	1.8	0.555
3	2009	7	17	2.428	0.411
4	2010	5	16	3.2	0.312
5	2011	10	39	3.9	0.256
6	2012	10	34	3.4	0.294
7	2013	11	51	4.636	0.215
8	2014	10	29	2.9	0.344
9	2015	10	47	4.7	0.212
10	2016	10	46	4.6	0.217
Total		83	303	3.650	0.273

Notes: *Average Authors per Paper (AAPP) = Number of authors/Number of papers.
Productivity per author = Number of papers/Number of authors.

Graph 2: Author's Productivity

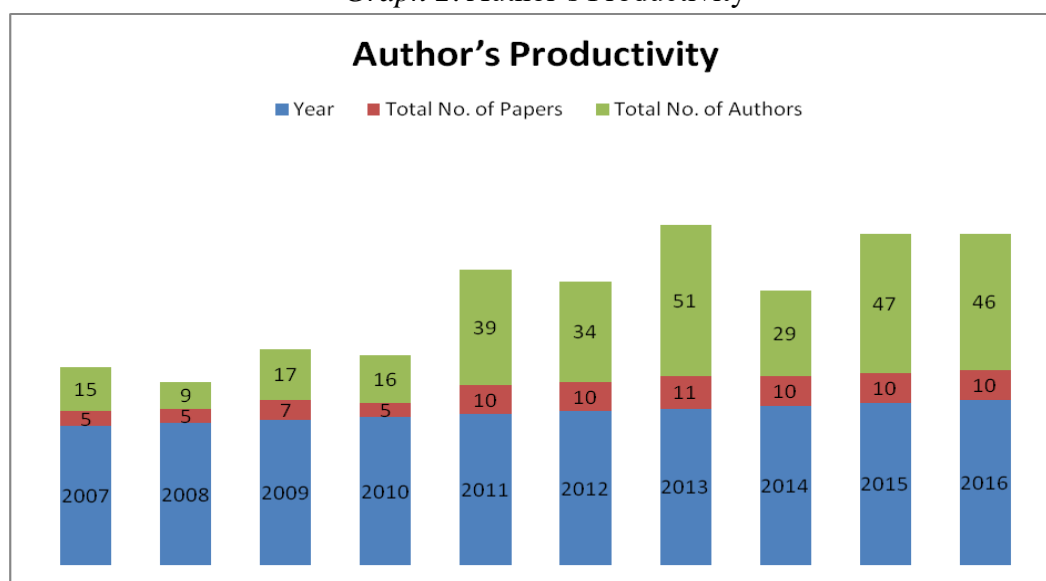


Table 4 and graph 2 shows the data related to author's productivity. The total average number of authors per paper is 3.650 and the average productivity per author is 0.273. The highest number of author's productivity 51(0.215%) was in 2013. The minimum number of author's productivity 9(0.555%) was in 2008.

Table 5: Most Prolific Authors

Sl. No.	Name	No. of Contributions	Country	Rank
1	Pal D. K	15	India	1
2	Bhattacharyya T	14	India	2
3	Ray S. K.	14	India	2

4	Datta S C	13	India	3
5	Chandran P	11	India	4
6	Ghosh Kunal	10	India	5
7	Manjaiah K.M	8	India	6
8	Varadachari Chandrika	8	India	6
9	Sarkar D	6	India	7
10	Das Sruti	4	India	8
11	Bansal O.P	3	India	9
12	Maurya U.K	3	India	9
13	Nair K.M.,	3	India	9
14	Raja P	3	India	9
15	Satyavathi P.L.A	3	India	9
16	Two Authors	17	--	10
17	Single authors	151	--	11
Total		303	--	--

Table 5 shows that a total of 303 authors have contributed 83 research contributions over a period of ten years (2007-2016). The most prolific contributor Pal D. K (India) who stood in the first position, he contributed the highest number (15) of publications. This is followed by Bhattacharyya T (India), and Ray S. K. (India) those stood in second highest contributions with 14 publications; Datta S C (India) 13 publications; Chandran P (India) with 11 publications; Ghosh Kunal (India), with 10 publications; Manjaiah K.M (India) and Varadachari Chandrika (India) with 8 publications; Besides, there are three who have contributed 5 research articles each. The remaining 17 contributions by two authors and 151 contributions have been contributed by single authors.

Table 6: Ranking by Authors

Sl. No.	Ranking	No. of Contributions	Percentage (%)
1	Faculty of Science	11	3.630
2	Scientist	5	1.650
3	Faculty of Agriculture	1	0.330
4	Faculty of Engineering	3	0.990
5	Ranking not mentioned	283	93.399
Total		303	100.000

Table 6 shows the greater part 11(3.630%) of the authored articles have been contributed by Faculty of Science. The second highest number of articles 5(1.650%) written by Scientist. And 3(0.990%) are faculty of engineering authored papers. The lowest number of contributions i.e., 1(0.330%) contributed by faculty of agriculture. And the 283(93.399%) were from ranking not mentioned by authors.

Table 7: Contribution by Institutions

Sl. No.	Institutions	No. of Contributions	Percentage (%)
1	Academic	64	21.122
2	Research	233	76.897
3	Others	6	1.980
Total		303	100

Graph 3: Contribution by Institutions

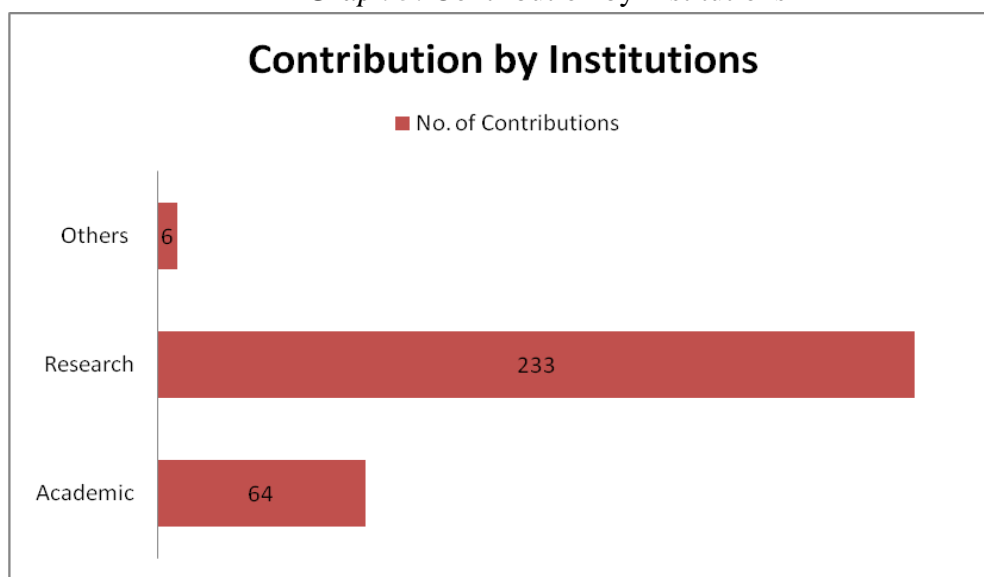


Table 7 and graph 3 shows the type of institutions with which the authors of the articles were affiliated. Out of 303 contributions, the highest number i.e. 233(76.897%) were from authors affiliated with research institutions; whereas the lowest number i.e. 6(1.980%) has been contributed by other institutions.

Table 8: Authorship by Country

Sl. No.	Country	No. of Contributions	Percentage (%)
1	India	274	90.429
2	Thailand	10	3.300
3	Morocco	7	2.310
4	Iran	5	1.650
5	Egypt	4	1.320
6	Trinidad	3	0.990
Total		303	100.00

Table 8 shows the distribution of authors by country. The 83 research articles were contributed by 303 authors from 6 countries. The highest number of authors 274(90.429) were from the India, followed by Thailand 10(3.300%), Morocco 7(2.310%), Iran 5(1.650%) and Egypt 4(1.320%). The lowest number of contributions 3(0.990%) were from Trinidad.

Table 9: Degree of Author Collaboration

Sl. No.	Year	Single Authored Paper (Ns)	Multi Authored Papers (Nm)	Total (Nm+Ns)	Degree of Collaboration
1	2007	--	5	5	1
2	2008	2	3	5	0.6
3	2009	--	7	7	1
4	2010	1	4	5	0.8
5	2011	--	10	10	1
6	2012	2	8	10	0.8
7	2013	1	10	11	0.909
8	2014	2	8	10	0.8
9	2015	--	10	10	1
10	2016	1	9	10	0.9
Total		9	74	83	0.891

DEGREE OF COLLABORATION

The extent of Degree of Collaboration in the clay research has been measured with the help of the formula devised by K. Subramaniam, (1993)

The formula is where

$$C = Nm / Nm + Ns$$

C = Degree of Collaboration in a discipline

Nm = Number of multiple authored papers

Ns = Number of single authored papers

Accordingly, the Degree of Collaboration has been calculated as follows:

$$C = \frac{74}{9 + 74} = \frac{74}{83} = 0.891$$

As a result, the average degree of author collaboration in the clay research is 0.891, which clearly indicates its dominance upon multi-author authored contributions.

FINDINGS AND CONCLUSION

In this article present an overview of global collaborative research trends in the clay research field. Nine topics are considered: research article contributions by year and issue,

authorship patterns by year and volume, authorship patterns, author's productivity, most prolific authors, ranking by authors, contribution by institutions, authorship by country and degree of author collaboration.

- ❖ The highest number of research articles 11(13.253%) was published in 2013.
- ❖ Majority 74(89.156%) of the papers have been written in joint authorship. It is seen that only 9(10.843%) of the publications were single authored articles.
- ❖ The total average number of authors per paper is 3.650 and the average productivity per author is 0.273. The highest number of author's productivity 51(0.215%) was in 2013.
- ❖ The most prolific contributor Pal D. K (India) who stood in the first position, he contributed the highest number (15) of publications. This is followed by Bhattacharyya T (India), and Ray S. K. (India) those stood in second highest contributions with 14 publications
- ❖ Greater part 11(3.630%) of the authored articles have been contributed by Faculty of Science. The second highest number of articles 5(1.650%) written by Scientist. And 3(0.990%) are faculty of engineering authored papers. The lowest number of contributions i.e., 1(0.330%) contributed by faculty of agriculture. And the 283(93.399%) were from ranking not mentioned by authors.
- ❖ Out of 303 contributions, the highest number i.e. 233(76.897%) were from authors affiliated with research institutions; whereas the lowest number i.e. 6(1.980%) has been contributed by other institutions.
- ❖ The 83 research articles were contributed by 303 authors from 6 countries. The highest number of authors 274(90.429) were from the India, followed by Thailand 10(3.300%), Morocco 7(2.310%), Iran 5(1.650%) and Egypt 4(1.320%). The lowest number of contributions 3(0.990%) were from Trinidad.
- ❖ As a result, the average degree of author collaboration in the clay research is 0.891, which clearly indicates its dominance upon multi-author authored contributions.

The Clay Research has been growing over 37 years from publishing research articles. The multi-author collaborations are leading role from early onwards. The Clay Research has been accepting articles from all over the country. As of today, there are 6 countries contributing research articles to the journal. The journal encourages contribution about professional policies, practices, principles and progress in the clay research.

Some findings are not surprising; the clay research is publishing articles mostly from Indian authors. The most prolific contributor Pal D. K, who stood in the first position; he

contributed the highest number (15) of contributions. This is followed by Bhattacharyya T and Ray S. K. who stood in second highest contributions with 14 publications both are from journal originate place of India. And also the most part of articles (i.e., 77) are from India. One surprising and encouraging set of data pertains to the second large number (2) of publications were from Morocco. In recent years the journal accepting articles from all over the country. As of today, there are 6 countries contributing research articles to the journal. It is getting world-wide popularity and identification by publishing scholarly articles from authors across the world.

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