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MAPPING THE RESEARCH PRODUCTIVITY OF JOURNAL OF CHEMICAL SCIENCES: A BIBLIOMETRIC STUDY

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ABSTRACT

The paper presents a bibliometric study of the Journal of Chemical Sciences for the period of 10 years (1987-1996) in which articles were published. The study focuses on necessary bibliometric analysis forms, authorship pattern analysis, year wise distribution of articles, issue wise distribution of articles, subject wise distribution analysis. The study revealed that that the maximum number of articles were published in the year 1993 (127) and minimum in the year 1994 (21) articles. The authorship pattern of the articles published during the period of study was contributed maximum by two authors 265 (27.20%), followed by three authors with 253 (25.98%) articles, five and more authors contributed 184 (18.89 %) articles, four authors with 177 (18.18%) and single author with 9.75% of the total articles. Out of 717 articles in the Journal of Chemical Sciences joint authors contributed 599 (83.54%) articles while the rest 118 (16.46%) articles were contributed by single author. Most of the works were done on physical and theoretical chemistry with 291 articles followed by inorganic and analytical chemistry with 208 articles.

Keyword: Journal of Chemical Sciences, Authorship pattern, Bibliometric, Subject distribution

1. INTRODUCTION

Bibliometrics is a set of techniques devoted to the quantitative analysis of scientific and technical activities. The subject of bibliometrics was first defined by Pritchard (1996) as “the application of mathematical and statistical methods to books and other media”. It involves the analysis of a set of publications characterized by bibliographic

variables such as the author(s), the place of publication, the associated subject keywords, and the citations. Bibliometrics employs quantitative analysis to measure patterns of scientific publication and citation, typically focusing on journal papers. It is used to measure scientific collaboration, assess interdisciplinary research and look for quality and excellence in research. Bibliometric analyzes are quantitative studies of publications and publication patterns. All significant compilations of science indicators heavily rely on publication and citation statistics and other, more sophisticated bibliometric techniques. The aim of bibliometric studies was to measure national research performance in the international context or to describe the development of a science field with the help of bibliometric means. Today, bibliometrics is one of the rare truly interdisciplinary research fields extended to almost all scientific fields. Bibliometric methodology comprises from mathematics, social sciences, natural sciences, engineering and even life sciences.

JOURNAL OF CHEMICAL SCIENCES

The Indian Academy of Sciences was founded and registered as a society in 1934 with the aim of promoting the progress and upholding the cause of science, in both pure and applied branches. It strives to meet its objectives through promotion of original research and dissemination of scientific knowledge to the community via meetings, discussions, seminars, symposia and publications. The Academy was founded in 1934 by Professor C. V. Raman (Nobel Laureate). Publication of scientific journals has been a major activity of the Academy since its formation in 1934 and the Proceedings of the Indian Academy of Sciences Part A and Part B began publication that very year. The Academy today publishes 12 journals, several of which grew out of the original Proceedings.

The Journal of Chemical Sciences is a bimonthly peer-viewed scientific journal that publishes original articles and rapid communications by Indian and other researchers, spanning topics in the chemical sciences. It was originally part of the Proceedings of the Indian Academy of Sciences – Section A, founded by the Nobel Laureate Professor C.V. Raman in 1934. the journal evolved into an independent journal titled ‘Proceedings – Chemical Sciences’ in 1978. It was renamed as Journal of Chemical Sciences in the year 2004. A significant feature is its special issues, brought out from

time to time, devoted to conference symposia/proceedings in frontier areas of the subject, held not only in India but also in other countries. Journal of Chemical Sciences is now distributed in print outside India and online worldwide by Springer, co-publisher of the journal. The frequency of the journal is given below:

2020: One volume per year

2015 – 2019 — 12 issues per year

1978 – 2014 — 6 issues per year

2. LITERATURE REVIEW

Verma, M. K., Devi, K. K. & Brahma, K. conducted a bibliometric study of the DESIDOC Journal of Library & Information Technology (DJLIT) for the period of 12 years (2005-2016) in which 553 articles were published. The study examined the various bibliometric parameters such as authorship pattern of articles & references, geographical distribution, major contributions from prolific author, state wise contribution of articles and number of references. The study revealed that India contributed highest publications with 88.95%. The Authorship Pattern of Articles for the study period was contributed maximum by two authors with 41.41%, followed by Single author with 36.88% and three authors with 15.18%. B.M. Gupta from India contributed the highest number of articles with 17.98%, followed by Chennupati K. Ramaiah (9.35%) and S.M. Dhawan (7.19%). New Delhi (23.44%) emerged at top most position with maximum number of contributions, which is followed by Karnataka (12.75%) and Maharashtra (10.86%). More than 63.11% articles published in the DJLIT were on co-authorship pattern.

Juan José Prieto-Gutiérrez & Francisco Segado-Boj conducted a thorough bibliometric analysis of research published in Annals of Library and Information Studies (ALIS), an India-based journal, for the period 2011–2017. Specifically, it compares this journal's trends with those of other library and information science (LIS) journals from the same geographical area (India, and Asia as a whole) and with the 10 highest-rated LIS journals worldwide. The source of the data used was the multidisciplinary database Scopus. To perform this comparison, ALIS' production was analyzed in order to identify authorship patterns; for example, authors' countries of residence, co-authorship trends, and collaboration networks. Research topics were

identified through keyword analysis, while performance was measured by examining the number of citations articles received. This study provides substantial information. The research lines detected through examining the keywords in ALIS articles were determined to be similar to those for the top LIS journals in both Asia and worldwide. Specifically, ALIS authors are focusing on metrics, bibliometrics, and social networking, which follows global trends. Notably, however, collaboration among Asia-based journals was found to be lower than that in the top-indexed journals in the LIS field, showing lesser internationalization. The results obtained present a roadmap for expanding the research in this field.

Garg & Bebi conducted a citation study of a number of articles published in *Annals of Library and Information Studies (ALIS)* and *DESIDOC Journal of Journal of Library and Information Technology (DJLIT)* from the period 2010-2013 and found that the average number of articles published in DJLIT are more than the articles published in ALIS during the period of study, for this reason DJLIT is published six times in a year, while ALIS is published four times in a year . It was also found that DJLIT 10 received more citations and published more papers than ALIS, citations per paper for both the journals are almost equal, DJLIT has a better immediacy index than ALIS and the impact factor of both the journals was less than one in 2012, but it increased in 2013 and was more than one.

Pradhan and Kumar, et al. conducted a citation analysis of library and information science (LIS) scholarly publication in International LIS Journals and examine the authorship pattern, collaborative nature, research distribution, etc. The researcher 13, 14 has taken citations from SCOPUS, Current Awareness Abstract Library and Information Management and Emerald management Review databases during the period 2001 to 2010. The findings revealed that 84.13% literatures are contributed in the form of journal articles, more than half literatures are contributed by collaborative Indian authors, out of 41 journals having 353 LIS literatures, only seven journals cross more than 10 literatures each of which shows only few set of core journals where majority of LIS literatures are published, Delhi, found to be of central place has increased the growth of LIS research in India, having 24.08% publications.

Verma, Yadav and Singh (2018) conducted a bibliometric study of *Library Philosophy and Practice (e-journal)* from 2008 to 2017. A total of 1478 scholarly

papers were published. It is found that the average growth rate of paper was 147.8 per year. The highest number of publications is in the year 2011 with 197(13.33%) followed by 2017 with 193(13.06%). Majority of papers during 2008-2017 in LPP are in the form of joint authorship, and 41.13% of articles are published in two authorship. From the 35 countries of the world contributed their articles in LPP during 2008-2017. With 42.23% contributions, Nigeria is in top rank while India (24.13%) and USA (9.52%) contribution stood second and third respectively. There are a total of 34907 references cited in 1478 articles from 2008-2017, and highest number of references (5619) has recorded in the year 2017.

Thanuskodi in his study deals with bibliometric analysis of articles and references provided at the end of each article contributed in Indian Journal of Chemistry from 2005-2009. The analysis cover mainly the number of articles, authorship pattern, forms of document cited, etc. All the studies point towards the merit and weakness of the journal which will be helpful for its further development. This study showed that most of the contributions are India. The authorship pattern of the articles published during the period of study. Maximum number of articles were contributed by two authors. This study also showed that majority of the contributors preferred journals as the source of information which occupied the top position. All the studies point towards the merits and weakness of the journal which will be helpful for its further development.

Thanuskodi (2010) discussed the research output performance of social scientists on social science subjects. The analysis cover mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc.

3. OBJECTIVES: The objectives of the study are:

- Examine the articles published in the Journal from 1987 to 1997.
- Evaluate the authorship pattern of articles.
- Quantify the issue wise distribution of articles.
- Analyze the major contributions subject wise.

4.SCOPE AND METHODOLOGY

The present study covers the articles published in Journal of Chemical Sciences from 1987 to 1997. The downloaded data consisted of the title of the articles, name of the authors and their affiliations. The results were tabulated and analyzed to meet the objectives mentioned above. A total of 717 articles were retrieved from 58 issues of 11 volumes of the journal covering the period of 1987-1997. The data has been analyzed and presented in the form of tables and graphs for interpretation.

5.SIGNIFICANCE OF THE STUDY

To conduct a bibliometric study on the open access journals is important as e-journals in the contemporary information technology era is very much significant in itself. The study on these journals helps the researchers, librarians in their relevant research works, collection planning and building. The readers will also procreate various information through this study which in turn will benefit the journals in gaining reputation and identification. The study focuses on necessary bibliometric analysis forms, authorship pattern analysis, year wise distribution of articles, issue wise distribution of articles, subject wise distribution analysis.

6.DATA ANALYSIS

6.1 Table 1: Year wise Distribution of Articles

Year	Vol.	No. Of Issues	No. Of Contribution	Percentage
1987	87	6	58	8.09
1988	88	6	59	8.23
1989	89	6	76	10.60
1990	90	6	64	8.93
1991	91	6	68	9.48
1992	92	5	65	9.06
1993	93	8	127	17.71
1994	94	3	21	2.93
1995	95	4	61	8.51
1996	96	4	58	8.09
1997	97	4	60	8.37
Total		58	717	100

Table 1 shows that the maximum number of articles were published in the year 1993 (127) and minimum in the year 1994 (21) articles. The journal publishes on an average of 65 articles per year.

6.2 Table 2: Distribution of Articles (Issue Wise)

Distribution of Articles Issue Wise														
Vol.	Issues	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10	Issue 11	Issue 12	Total Publications
87	6	8	NP	NP	9	NP	9	NP	12	NP	9	NP	11	58
88	6	9	8	12	12	9	9	NP	NP	NP	NP	NP	NP	59
89	6	10	16	14	14	14	8	NP	NP	NP	NP	NP	NP	76
90	6	10	12	6	15	11	10	NP	NP	NP	NP	NP	NP	64
91	6	11	8	14	11	12	12	NP	NP	NP	NP	NP	NP	68
92	5	12	11	13	25*	-	4	NP	NP	NP	NP	NP	NP	65
93	8	10	18	20	22	10	13	15	19	NP	NP	NP	NP	127
94	3	5	4	12	NP	NP	NP	NP	NP	NP	NP	NP	NP	21
95	4	16*	-	13	14	18*	-	NP	NP	NP	NP	NP	NP	61
96	4	12*	-	18*	-	12	16	NP	NP	NP	NP	NP	NP	58
97	4	15	14	16*	-	15*	-	NP	NP	NP	NP	NP	NP	60
Total	58	118	91	140	123	101	80	15	31	NP	9	NP	11	717

The table 2 reveals distribution of articles (Issue-wise). Volume 93 shows the highest number of total articles (127) followed by Volume 89 with 76 articles. It is followed by volume 91 with 68 articles. The lowest number of total articles 21 is in volume 94. Most of the publication are in issues 3 and 4 with numbers 140 and 123 respectively. The lowest are in issues 7,10 and 12.

6.3 Table 3: Authorship Pattern

Year	Number of Authors					Total
	Single Author	Two Authors	Three Authors	Four Authors	Five Authors & more	
1987	7	24	23	4	-	58
1988	9	27	17	3	3	59
1989	5	33	28	9	1	76
1990	3	34	24	2	1	64
1991	7	32	14	10	5	68
1992	17	23	21	2	2	65
1993	37	42	30	13	5	127

1994	3	11	6	1	-	21
1995	5	33	14	5	4	61
1996	19	22	12	5	-	58
1997	6	25	20	7	2	60
Percentage	118	306	209	61	23	717

Table 3 reveals the authorship pattern of the articles published during the period of study. Maximum number of articles were contributed by two authors 265 (27.20%). This is followed by three authors with 253 (25.98%) articles, five and more authors were contributed 184 (18.89 %) articles, four authors with 177 (18.18%) and single author with 9.75% of the total articles.

6.4 Table 4: Year-wise Authorship pattern

Authorship	Year											Total	Percentage
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997		
Single	7	9	5	3	7	17	37	3	5	19	6	118	16.46%
Joint	51	50	71	61	61	48	90	18	56	39	54	599	83.54%
Total	58	59	76	64	68	65	127	21	61	58	60	717	100

The above table-4 showed that out of 717 articles joint authors contributed 599 (83.54%) articles while the rest 118 (16.46%) articles were contributed by single author.

6.5 Table 5: Issue Wise Article Distribution Pattern of Authors

Author Type	Distribution Issue Wise										Total Articles (& %age)
	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 10	Issue 12	
Single	21	8	20	31	7	19	3	5	3	1	118 (16.46%)
Two	43	39	66	47	47	38	5	14	2	5	306 (42.67%)
Three	40	34	34	30	33	19	5	6	4	4	209 (29.15%)
Four	10	6	17	6	12	3	1	5	-	1	61 (8.51%)
Five & more	4	4	6	3	2	2	1	1	-	-	23 (3.21%)
Total	118	91	143	117	101	81	15	31	9	11	717 (100%)

Table 5 reveals the article distribution pattern of authors (Issue wise). The table clearly shows that out of 717 articles, the highest 306 are two author publications, followed by three authored with 209 articles.

6.6 Table 6: Subject-wise distribution of articles

Year	Topics													
	Organic	Physical and Theoretical	Inorganic Analytical	DNA Protein Interaction	Dehydrogenation	Rapid Communication	Instrumentation	Electrical Properties	Erratum	Crystallography	Energy Sources	Solid state chemistry & Surface Chemistry	Structural chemistry	Miscellaneous
87	16	25	14	1	1	-	-	1	-	-	-	-	-	-
88	11	33	15	-	-	-	-	-	-	-	-	-	-	-
89	14	44	18	-	-	-	-	-	-	-	-	-	-	-
90	8	27	28	-	-	-	-	-	1	-	-	-	-	-
91	15	29	24	-	-	-	-	-	-	-	-	-	-	-
92	6	21	13	-	-	-	-	-	-	23	-	-	-	2
93	42	37	23	-	-	-	1	-	-	2	1	11	10	-
94	5	6	10	-	-	-	-	-	-	-	-	-	-	-
95	12	20	26	-	-	-	2	1	-	-	-	-	-	-
96	8	31	16	-	-	3	-	-	-	-	-	-	-	-
97	15	18	21	-	-	5	1	-	-	-	-	-	-	-
Total	152	291	208	1	1	8	4	2	11	25	1	11	10	2

Table 6 reveals the subject-wise distribution of articles. Out of 717 articles, most of the works were done on physical and theoretical chemistry with 291 articles followed by inorganic and analytical chemistry with 208 articles.

7. FINDINGS

The major findings from the present study are:

1. The total number of articles from the period marked (1987-1997) is 717 articles. Volume 93 shows the highest number of total articles 127 (17.71%) followed by Volume 89 with 76 articles (10.60%). It is followed by volume 91

with 68 articles (9.48%). The lowest number of total articles 21 (2.93%) is in volume 94. Most of the publication are in issues 3 and 4 with numbers 140 and 123 respectively. The lowest are in issues 7,10 and 12.

2. Most of the publication are in issues 3 and 4 with numbers 140 and 123 respectively. The lowest are in issues 7,10 and 12.
3. The authorship pattern of the articles published during the period of study was contributed maximum by two authors 265 (27.20%), followed by three authors with 253 (25.98%) articles, five and more authors contributed 184 (18.89 %) articles, four authors with 177 (18.18%) and single author with 9.75% of the total articles.
4. Out of 717 articles joint authors contributed 599 (83.54%) articles while the rest 118 (16.46%) articles were contributed by single author.
5. The article distribution pattern of authors (Issue wise) shows that out of 717 articles, the highest 306 are two author publications, followed by three authored with 209 articles.
6. Most of the works were done on physical and theoretical chemistry with 291 articles followed by inorganic and analytical chemistry with 208 articles.

7.CONCLUSION

The acceptance of bibliometric techniques worldwide in different disciplines made tremendous growth of literature and its subsequent areas. The technique is favorable for a number of purposes which includes selection of journals for the libraries, showing the benefits of a desired field, scientific output evaluation, determining scientific indicators. The cost barrier is reduced by the open access mode which helps in accessing various scholarly articles by the global users. The present study conducts a bibliometric analysis of 717 articles published in the Journal of Chemical Sciences for the period of 11 years. The study found that maximum number of articles were contributed by two authors 265 (27.20%), followed by three authors with 253 (25.98%) articles, five and more authors contributed 184 (18.89 %) articles, four authors with 177 (18.18%) and single author with 9.75% of the total articles.

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