SCIENTOMETRIC ANALYSIS OF CONTRIBUTIONS TO PAKISTAN JOURNAL OF LIBRARY AND INFORMATIN SCIENCE (PJLIS)

Obaid Hafiz[1], Wasim Rashid[2], Muneer Ahmad[3]

[1]*Library Professional, Central University of Kashmir, Nowgam Srinagar, Jammu & Kashmir, India*

[2]*Library Professional, Central University of Kashmir, Nowgam Srinagar, Jammu & Kashmir, India*

[3]*Ph.D Research Scholar, Department of Library and Information Science, Annamalai University,*
Tamil Nadu, India

ABSTRACT

*Scientometric analysis of 59 research articles published in **Pakistan Journal of Library and Information Science** (PJLIS) has been carried out. Seven Volumes of the journal containing 8 issues from 2011 – 2016 have been taken into consideration for the present study. The number of contributions, authorship pattern & author productivity, average citations, average length of articles, average keywords and collaborative papers has been analyzed. Out of 59 contributions, only 18 are single authored and rest by multi authored with degree of collaboration 0.69 and week collaboration among the authors. Pattern of Co-Authorship revealed that the improving trend of co-authored papers. The study revealed that the author productivity is 0.50 and dominated by the Pakistani authors.*

Keywords: Author Productivity, Bibliometrics, Collaboration pattern, Pakistan Journal of Library and Information Science, Scientometrics.

1.0 INTRODUCTION

Bibliometrics is defined as the application of mathematical and statistical methods to the entire scientific literature, books and documents included (Pritchard, 1969)[1]. It has become a generic term for a range of approaches directed at quantifying output levels, collaboration patterns and impact characteristics of scientific research (Okubo, 1997)[2]. In other words, it is the organization, classification and quantitative evaluation of the publication pattern of macro-communication, along with their authorship, by mathematical and statistical calculations. The word "bibliometrics" has been derived from the Latin and Greek words "biblio" and "metrics" which refer to the application of mathematics to the study of bibliography. Bibliometric analysis serves as a useful tool in assessing the quality of a journal and its articles (Thanuskodi, 2010)[3]. Bibliometric studies have been applied mainly to scientific fields and are based principally on various metadata elements such as author, title, subject, citations, etc. related to scholarly publication within a discipline. This type of analysis provides

useful indicators of scientific productivity, trends, emphasis of research in various facets and researchers' preferences for publication (Jacobs, 2001)[4]

In this paper, an attempt has been made to analyze the contributions to Pakistan Journal of Library and Information Science published during the year 2011 – 2016, in order to explore the author pattern, collaborative research, keywords and length of the papers among the contributions. This study covers the 59 articles of 8 issues published.

2.0 Source

Pakistan Journal of Library and Information Science (PJLIS) was selected as the source journal for the present research study. Pakistan Journal of Library and Information Science (PJLIS) is a popular journal of library and information science (LIS) in Pakistan. PJLIS, which was known as Pakistani Librarian till 1999, was started in 1995 as an annual journal by the Department of Library and Information Science, University of the Punjab, Lahore. With a gap of six years, eight issues were published up to 2016. Initially it was bilingual, but since volume 2006 it has been published in English language only. (Warraich & Ahmad, 2011)5

3.0 Literature Review

Scientometric/Bibliometric/Citation studies have done earlier by different authors on the different individual journal publications and literature on specific subject areas. The following studies related to the objectives of this study have been reviewed. (Srimurugan & Nattar,2009)6 analyzed the D-LIB magazine published during 2000 – 2007 which revealed that highest number of paper was published in 2005 and the lowest in 2007.(Vijay & Raghavan,2007)7 analyzed the Journal of Food Science & Technology published during 2000 – 2004 and found that above 93% of contributions were by multiple authors. A Scientometric Analysis on Indian Journal of Physics was made by Nattar S8 during 2004 – 2008 which revealed that the year 2004 records the highest % of contributions regarding single, two and three authored.Kannappanavar B U, Swamy C & Vijay Kumar M9 analyzed the publishing trends of Indian Chemical Scientists during 1996 – 2000, which revealed average number of authors per paper has increased from 7.52 to 8.39.An attempt was made by Tilak Hazarika, Kusuma Goswami & Pritimoni Das10 to analyze the contributions of Indian authors which found Degree of Collaboration was 0.64 among the authors. Guan & Ma11 examined the China's Semiconductor Literature and found mega authored papers records the higher value for Co-Authorship Index.Senthamilselvi & Srinivasa Raghavan12 analyzed the issues of IEEE Trans on Power Electronics published during 2006 – 2008 which revealed that maximum number of papers was published between 6 – 10 pages category. A bibliometric study has been carried out by Kalyane V L and Sen B K13 on the Journal of Oilseeds Research published during 1984 – 1992 which revealed that the keyword "Groundnut" tops the list with 53 records.Sanni S A and Zainab A N 14examined the contributions published in Medical Journal of Malaysia during 2004 – 2008 and found 4.82% (28) of contributions were published by Malaysian authors with foreign collaboration.

4.0 OBJECTIVES OF THE STUDY

The objectives of this study are

- to map the year wise distribution of papers
- to examine the authorship pattern & author productivity
- to determine the degree of collaboration
- to assess the pattern of Co-Authorship
- to identify collaborative pattern
- to find the average length of papers
- to find the average keywords

5.0 SCOPE AND METHODOLOGY

The present study tries to find out the literature growth, authorship and collaboration pattern, average length of articles and average keywords in the source journal. Seven Volumes (Vol. No.12 to No.18) of *Pakistan Journal of Library and Information Science (PJLIS)*, published between 2011 and 2016 containing 8 issues have been taken into consideration to the present study.

A datasheet was prepared in MS-Excel to record the data and then the data was entered manually into it from the journal itself. The details regarding number of papers, nature of author, keywords and length of papers are collected to fulfill the objectives of the present study. The collected data was analyzed with the following bibliometric indicators.

- Extent of Authorship Pattern (Single vs. Multiple)
- Degree of Collaboration
- Co-Authorship Index

6.0 LIMITATIONS

- Since the journal publishes Reviews, Research Papers and Research Reports, this study is based only on the Research Papers.
- This study is limited to research papers published between 2011 and 2016 only.

7.0 RESULTS AND DISCUSSION

7.1 Year wise distribution of papers

Table 1 shows the distribution of research articles published in Journal of Scientific and Industrial Research during 2011 – 2016. The total of 59 research articles was published with an average of 9.83 articles per year. Out of 59 articles, the highest number of research articles were published in the year 2016 with 30 research articles (10 articles per issue) followed by the 2012-2015 ; 6 articles each year, and the lowest number of articles were published in the year 2011 with 5 articles (8.47 articles per issue).

Table 1 - Year Wise Distribution of Papers					
Year	Vol. No.	No. Of Issues	Total Papers	Research Papers	% of Research Papers
2011	12	1	19	5	8.47
2012	13	1	18	6	10.17
2013	14	1	10	6	10.07
2014	15	1	9	6	10.17
2015	16	1	9	6	10.17
2016	17	1	27	20	33.90
2016	18	2	11	10	16.95
Total		8	103	59	57.28

7.2 Authorship Pattern

It is observed from the Table 2; about 69% of papers were contributed by multi authors. Out of 59 papers, the highest number of papers was published by double authors and it accounts for 26 with 44.07% followed by single authored articles account for 18 with 30.51%. 20.34% of articles were published by three authors. 5.08 % of articles were published by four authors. But the trend of the author pattern in the journal shows that the team size was two to three.

Table 2 – Authorship Pattern					
Rank	Authors	No. Of Papers	%	Cum No of Papers	Cum %
1	Two	26	44.07	26	44.07
2	Single	18	30.51	44	74.58
3	Three	12	20.34	56	94.92
4	Four	3	5.08	59	100
	Total	59			

7.3 Authorship Pattern year wise

The data pertaining to authorship pattern year wise have been given in the Table No.3. Regarding single authored contributions, the years 2016 & 2012 have the highest contributions with 10 and 4 each and the zero in 2015. Regarding double authored contributions, the year 2016 has the highest contributions with 14. The

year 2016 has the highest contributions regarding three authored contributions with 5 and 2015 with 2. The year 2015 has the highest contributions of four authored (more than three authors) with 2.

Table 3 – Authorship Pattern year wise					
Year	**Authors**				
	1	2	3	4	Total
2011	2	3	0	0	5
2012	4	0	2	0	6
2013	1	4	1	0	6
2014	1	3	2	0	6
2015	0	2	2	2	6
2016	10	14	5	1	30
Total	18	26	12	3	59

7.4 Author Productivity

The data pertaining to author productivity has presented in the Table 4. The table shows that the total average number of authors per paper is 1.98 for the 59 articles. The years 2011 & 2012 has the relatively equal average number of authors per article when compared the total average number of authors per article. The average productivity per author is 0.50 during the year 2011 - 2016. The years 2016 has the relatively equal productivity per author when compared to the average productivity. Productivity has been calculated with the following formula (Fuyuki, 2009)15

Average Authors per Paper = No. of Authors / No. of Papers

Productivity per Author = No. of Papers / No. of Authors

Table 4 – Author Productivity					
S.No.	**Year**	**Total No. of Papers**	**Total No. of Authors**	**AAPP**	**Productivity per Author**
1	**2011**	5	8	1.6	0.63
2	**2012**	6	9	1.5	0.67
3	**2013**	6	12	2	0.5
4	**2014**	6	13	2.17	0.46
5	**2015**	6	18	3	0.33

| 6 | 2016 | 30 | 57 | 1.9 | 0.53 |
| Total | | 59 | 117 | 1.98 | 0.50 |

7.5 Degree of Collaboration

In order to determine the strength of Collaboration (DC), the following formula suggested by (Subramanyam, 1993)[16] has been employed.

$DC = N_m/N_m + N_s$

Where, DC = Degree of Collaboration

N_m = Number of Multiple Authored Papers

N_s = Number of Single Authored Papers

The Degree of Collaboration of authors by year wise is presented in the Table 5. The degree of collaboration ranges from 0.33 to 1. The average degree of collaboration is 0.69 during the period 2011 – 2016 and it brings out clearly that there exists a low level of collaboration in the journal.

Table 5 : Degree of Collaboration					
S.No.	Year	N_s	N_m	$N_s + N_m$	DC
1	2011	2	3	5	0.6
2	2012	4	2	6	0.33
3	2013	1	5	6	0.83
4	2014	1	5	6	0.83
5	2015	0	6	6	1
6	2016	10	20	30	0.67
Total		18	41	59	0.69

7.6 Pattern of Co-Authorship

In order to assess the Pattern of Co-Authorship (CAI), the following formula suggested by (Garg and Padhi, 1999)[17] has been employed.

$CAI = \{(N_{ij}/N_{io})/(N_{oj}/N_{oo})\} X 100$

Where,

N_{ij} = Number of papers having authors in block i

N_{io} = Total output of block i

N_{oj} = Number of papers having j authors for all blocks

N_{oo} = Total number of papers for all authors and all blocks

CAI = 100 implies that a country's co-authorship effort for a particular type of authorship corresponds to the world average, CAI > 100 reflects higher than average co-authorship effort, and CAI < 100 lower than average co-authorship effort by that country for a given type of authorship pattern.

For calculating the co-authorship index for authors, countries have been replaced by block. For this study, the authors have been classified into four blocks, viz Single, Two, Three and more than three authors and the results of Co-authorship index as per the formula have been presented in the Table No.6.

S.No.	Year	Single Author		Two Authors		Three Authors		>Three Authors		Total
		No	CAI	No	CAI	No	CAI	No	CAI	
1	2011	2	131	3	136	0	0	0	0	5
2	2012	4	218	0	0	2	164	0	0	6
3	2013	1	55	4	151	1	82	0	0	6
4	2014	1	55	3	113	2	164	0	0	6
5	2015	0	0	2	76	2	164	2	656	6
6	2016	10	109	14	106	5	82	1	66	30
Total		18		26		12		3		59

Table 6 : Pattern of Co-Authorship

It is observed from the Table 6, the CAI for single authors is declined from 131 in the year 2011 to 109 in the year 2016. In the same way, the CAI for double authors is also declined from 136 in the year 2011 to 106 in the year 2016, which indicates the pattern of co-authorship is decreasing among the contributions of the journal. On the other hand, there is a fluctuation trend of CAI for multi authored contributions.

7.7 Distribution of Pages

Table 7 shows that 59 papers published with a total page of 593 (average 10.05 pages per article) during the year 2011 – 2016. It is observed that the average length of the articles varied from a minimum of 6.83 pages to a maximum of 11.67 pages. The year 2016 has highest average page per paper with 11.67 pages while the year 2013 has the lowest average page per paper with 6.83.

Table 7 – Distribution of Pages				
S.No.	**Year**	**No. of Articles**	**Total Pages**	**Average Pages Per Article**
1	2011	5	47	9.4
2	2012	6	48	8
3	2013	6	41	6.83
4	2014	6	53	8.83
5	2015	6	54	9
6	2016	30	350	11.67
Total		59	593	10.05

7.8 Average Keywords per Article

Table 8 reveals that 268 keywords have been appended to 59 papers. It is observed that the average keyword of the paper varied from a minimum of 3 to a maximum of 5.33 during the year 2011 – 2016. The year 2014 has the highest average keyword per paper with 5.33 keywords per paper while the year 2012 has the lowest average keywords per paper with 3. The overall average keywords per article are 4.54.

Table 8 – Average Keywords per Article				
S. No.	**Year**	**No. of Articles**	**Total Keywords**	**Average Keywords per Paper**
1	2011	5	19	3.8
2	2012	6	18	3
3	2013	6	25	4.17
4	2014	6	32	5.33
5	2015	6	24	4

6	2016	30	150	5
	Total	59	268	4.54

7.9 Distribution of Pakistani and Foreign Contributions

Table 9 shows that out of 59 articles, 94 (77.05%) articles published by Pakistani Authors followed by International Authors with 23 Articles (18.85%). Only 5 (4.10%) articles published by Pakistani Authors collaborated with international Authors and similar type of study has been conducted by (Zainab A N, et al ,2009)[18]. It seems that there was poor collaboration of Pakistani authors with foreign authors. It is observed from the data that out of 8 issues, 5 issues having the contributions only by Foreign Authors.

Table 9 - Distribution of Pakistani and Foreign Contributions		
Form	**Contributions**	**%**
Pakistani Authors	94	77.05
Pakistani Authors with Foreign Collaboration	5	4.10
Foreign Authors	23	18.85
Total	122	

8.0 Findings and Conclusion

The study has revealed the findings which will be useful to information managers and persons associated with Pakistan Journal of Library and Information Science (PJLIS).The maximum number of papers published in 2016 and minimum in 2011. The highest number of research papers contributed by multiple authors during the study period. The degree of collaboration was 0.69. It is found that the average value for CAI was around 100 during the study period and it reflects the world average. The author productivity is 0.50 and the average number of authors per paper is 1.98.The average pages per paper are 10.05. The average keywords per paper are 4.54. The majority of the contributions are by Pakistani Authors (77.05%). Papers by Pakistani Authors with Foreign Collaboration are minimal (4.10% of articles).The analysis explores that the majority of papers by multi authors and Pakistani authors. There was poor international collaboration by Pakistani authors. The average page is 10.05 and it is the ideal for research papers. The Degree of collaboration (using

Subramanyam's formula) indicates that there exists a high degree of collaboration. The average Co-Authorship Index for all the authors reflects the world average in the journal and improving trend of co-authored papers. The study revealed that the journal seems to be popular among the international research community with around 19% of papers.

REFERENCES

1. Pritchard, A., Statistical Bibliography of Bibliographies, *Journal of Documentation*, *25 (4)*, 1969, 348-349.

2. Okubo, Y., Bibliometric Indicators and Analysis of Research Systems: Methods and Examples, *OCDE (1),* 1997, 1-70.

3. Thanuskodi, S., Bibliometric analysis of the journal library philosophy and practice from 2005-2009, *Library Philosophy and Practice,* 2010 , *1-7*

4. Jacobs, D. ,A bibliometric study of the publication patterns of scientists in South Africa 1992-96, with particular reference to status and funding, *Information Research, 6(3),* 2001, *104*

5. Warraich, N.F. and Ahmad S., Pakistan Journal of Library and Information Science: A bibliometric analysis, *Pakistan Journal of Library and Information Science*, *12 (1),* 2011, 1-7.

6. Srimurugan, A and Nattar, S., D-LIB Magazine: A Bibliometric Study, *Indian Journal of Information Science and Services, 3 (1),* 2009, 1-4.

7. Vijay, K R and Raghavan, I., Journal of Food Science and Technology: A Bibliometric Study, *Annals of Library and Information Studies*, *54 (4),* 2007, 207-212.

8. Nattar, S., Indian Journal of Physics – A Scientometric Analysis. *International Journal of Library and Information Science*, *1(4),* 2009, 055-061.

9. Kannappanavar, B U, Swamy, C and Vijay Kumar, M., Publishing Trend of Indian Chemical Scientists: A Bibliometric Study, *Annals of Library and Information Studies*, *51 (1),* 2004, 39-41.

10. Tilak, H.K, Kusuma, G and Pritimoni, D., Bibliometric Analysis of Indian Authors: 1991 – 2000, *IASLIC Bulletin*, *48 (4),* 2003, 213-223.

11. Guan, J and Ma, N ,A Bibliometric study of China's Semiconductor Literature compared with other major Asian countries, *Scientometric*, *70 (1),* 2007,107-124.

12. Senthamilselvi, A and Srinivasa Raghavan, S. (2010). Scientometric Analysis of IEEE Transaction on Power Electronics, Paper presented at the Sixth International Conference on Webometrics, *Informetrics and Scientometrics & Eleventh COLLNET Meeting*, Mysore on 19-22 October, 2010.

13. Kalyane V L and Sen B K., A Bibliometric Study of Journal of Oilseeds Research, *Annals of Library Science and Documentation*, *42 (4),* 1995, 121-141.

14. Sanni, S A and Zainab, A N. ,Google Scholar as a source for citation and impact analysis for non-ISI indexed medical journal, *Malaysian Journal of Library and Information Science*, *15 (3),* 2010,35-51.

15. Fuyuki Y et al,An analysis of the connection between researchers productivity and their co-authors' past attributions, including the importance in collaboration networks. *Scientometric*, *79 (2),* 2009, 435-449.

16. Subramanyam, K., Bibliometric Study of Research Collaboration: A Review, *Journal of Information Science*, 6 (1), 1993, 33-38.

17. Garg, K C and Padhi, P. ,Scientometrics of Laser Research Literature as viewed through the Journal of Current Laser Abstracts, *Scientometrics, 45 (2),* 1999,251 – 268.

18. Zainab A N, Anyi K W U and Anuar N B., A Single Journal Study: Malaysian Journal of Computer Science, *Malaysian Journal of Computer Science, 53 (1),* 2006, 22 – 30.