An Analysis of Citation Pattern of the Journal Opsearch 2013-14: A Case Study

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ABSTRACT: *The study covers 1843 citations used in the 70 Research articles published in 8 issues of the journal OPSEARCH for the period of January 2013 to December 2014. From the citation pattern it revealed that individual research is quite substantial only 31.70%. 68.30 % of the research work is the result of group research. The group size is small ranging from 2 to 5.Of the citation count 80.1% relate to journal articles followed by 10.5% Monographs, 4.3% Conference Proceedings, and 2.4% E documents. International citations have been found more with 80.29% and Indian Citation 19.70% of the total citation. The study reveals that 7% of the total citations are Author Self Citation and 1.03% is Journal Self Citation. The ratio of Author Self Citation and Journal Self Citation is 7:1. The highest percentage of the year wise journal citation was found to be 45.63% in the period of 2003-2013.*

Key Words*: Authorship Pattern, Bibliometrics, Citation Analysis.*

I. INTRODUCTION

Bibliometric Analysis is the quantitative description of literature and used as a measurement tools of the patterns as well as all forms of recorded information and their producers. Citation Analysis [2] is one of the most widely used methods of Bibliometric Analysis. It is the examination of the frequency, patterns and graphs of citations in articles and books. It uses citations in scholarly works to establish links to other related works of other researchers. Smith [7] suggested that a Citation implies a relationship between a past or the whole of the citing documents. Just as there are number of reasons why a citing author has not provided a link to certain other documents. The reason is that a prior document is not relevant to the present work, or author was unaware of document or could not obtain it, or could not read the language in which it was published .The easiest technique to use a Citation Count is determining how many citations have been received by a given document or set of documents over a period of time from a particular set of citing documents. OPSEARCH is the quarterly journal & official publication of Operational Research Society of India, which is a national forum established with the aims of promoting the education and application of Operation Research in day to day practice and Projects in Business, Industry and other organization. Contents of the journals mainly divided into three parts Application Articles, Theoretical Articles and Technical Notes. Springer India from 2009 is responsible for printing and distribution of this journal. Articles abstracted and indexed in SCOPUS, Zentrablatt Math, Google Scholar, Proquest, Academic One File, Current Index to Statistics, Indian Science Abstracts, Mathematical Reviews, OCLC, Scimago, STMA-Z etc. SJR indicator measures the scientific influence of the average article in the journal. It expresses how central to the global scientific discussion an average article of the journal is. SCImago Journal and country rank is a portal that includes the journal and country scientific indicator developed from the information contained in the SCOPUS database (Elsevier B.V).The platform takes its name from SCImago Journal Rank (SJR) indicator developed by SCImago from widely known algorithm Google Page Rank. According to SJR, H Index of the Journal OPSEARCH is 6 in the year 2013.[8]

OBJECTIVE: *The objectives of the present study are to find the following*
1. *Authorship pattern of citation*
2. *Citations according to the documents type or forms*
3. *Ratio of author self citation and total citation*
4. *Ratio of journal self citation and total citation*
5. *Comparison between journal self citation and author self citation*
6. *Subject coverage of the journal articles*
7. *Mean length of articles in pages and mean time taken between acceptance and online publication of that article.*

II.   SCOPE AND LIMITATION OF THE STUDY

Easy access and timely completion adversely affect the success rate of any investigation. Hence keeping the infinite storehouse of knowledge and limited time span the present study is based on1843 articles appended to 70 Research Articles comprising of 29 Application Articles, 35 Theoretical Articles and 6 Technical Notes published in the Journal OPSEARCH in January2013 to December 2014 (Volume 50, Number1 to Volume 51, Number 4 issues).As such on average an article has almost 26 references and average authors per article is 2.

III.   METHODOLOGY

The references appended to each articles were scanned and tabulated employing systematic sampling method. On the basis of calculation of percentage, ranking has been done. Arithmetic Mean was calculated for the length of articles in pages and Time period taken between acceptance and online publication of that article. For each references the elements like Number of authors, Type of documents, Journal self citation, Author self citation, Ratio of journal self citation and author self citation, length of article in pages and mean time taken between acceptance and online publication of that article were recorded and analyzed.

ANALYSIS AND INTERPRETATION OF DATA: *The data collected with regards to objectives stated before were critically analyzed and presented in the following tables.*

Table I: Authorship Pattern of Citations

No of Authors	No of citations	Percentage (%)	Ranking
One	584	31.70	2
Two	726	39.40	1
Three	394	21.40	3
Four	116	6.30	4
More than Four	23	1.2	5
	1843	100	

Table 1 gives Split up of 1843 citations and ranking according to number of authors contributing papers. It is revealed that 584 (31.70%) out of 1843 citations are single authored. It indicates that solo research is quite substantial in this field 726(39.40%) of contributions are by two authors and 394(21.40%) by three authors. Joint contributions by two or more authors accounts nearly 68.30%.Team size in group research ranges from 2 to more than 4 (5 and 6).
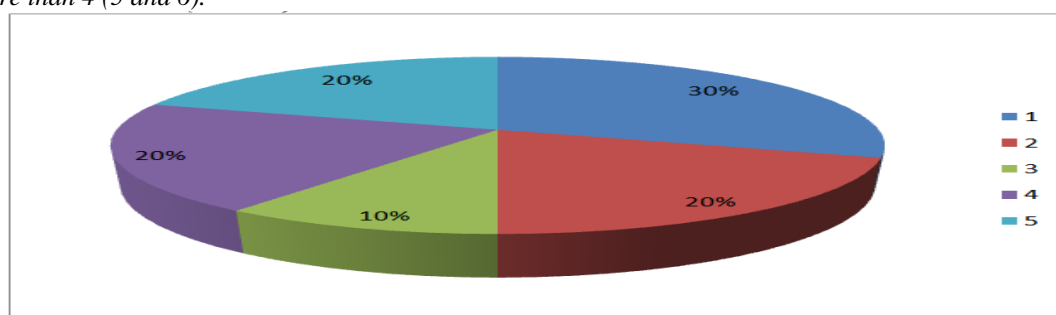

Figure 1: Authorship Pattern of Citation

Table II: Distribution of citation according to Type of documents

Sl No	Type of document	No of citations	Percentage (%)	Ranking
1	Journal Articles	1477	80.1	1
2	Monographs	194	10.5	2
3	Conference Proceedings	79	4.3	3
4	Report	15	0.813	6
5	Web document	45	2.4	4
6	Thesis/Dissertations	20	1.085	5
7	Research /News Letter	1	0.05	9
8	Models/Charts	7	0.38	7
9	Lecture Notes	5	0.27	8

Table 2 provides information about the documentary sources used by the contributors of articles published in the source journal. Citations in this study comprised mostly by Journal Articles(80.1 %), followed by Monographs(10.5 %),Conference Proceedings(4.3%),Web documents(2.4%), Thesis (1.085%),Reports(0.813%), charts (0.38%), Lecture Notes (0.27%) and Research/News Letter (0.05%).

It is generally observed that citations of journal articles predominate in any scientific literature or preparation of scholarly work and this study also confirms to it. It is clear from the study that contributors prefer to refer mostly journal articles for support of their thought /research or preparation of a scholarly work.
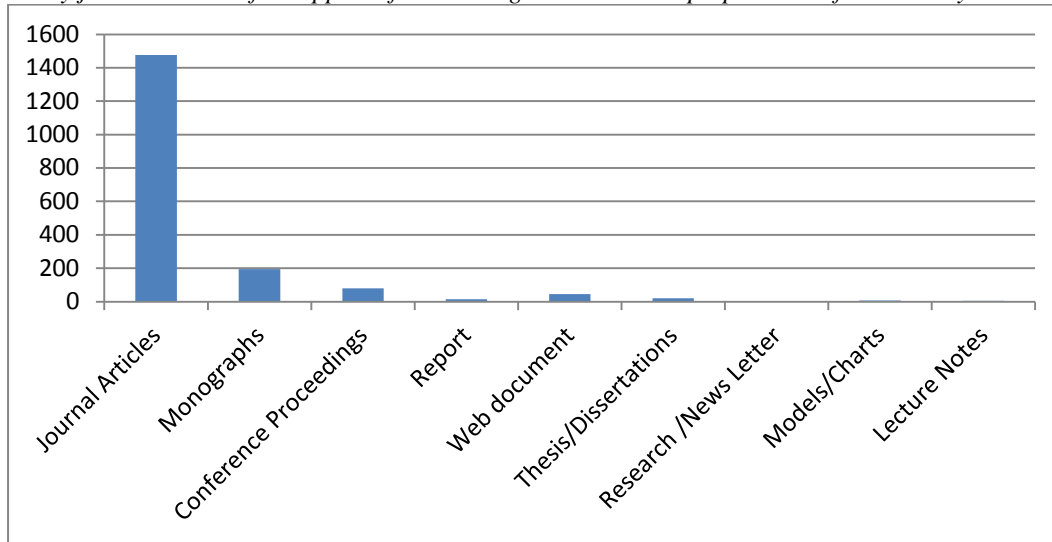

Figure 2: Frequency of citation according to the types of the document

Table III: Authors Self Citation (ASC)

No of Articles	Total Citation(TC)	Author Self Citation (ASC)	% of Author Self Citation (ASC)	ASC:TC
70	1843	129	7	1:14

The present study identifies 129 Author Self Citation that accounts only 7 % of the citations. The ratio of Author Self Citation to Total Citation is 1:14. It will clearly indicates that citing relevant and supporting researches of other authors for conducting research is dominating and preferable among the scientific community of operation research.

Table IV: Journal Self Citation (JSC)

No of Articles	Total Citation(TC)	Journal Self Citation (JSC)	% of Journal Self Citation (JSC)	JSC:TC
70	1843	19	1.03	1:97

Journal self citation is an interesting bibliometric indicator that gives an indication about the popularity of the journal among its contributor and reader community. Journal Self Citation 1.03% is far lower as compared to the percentage of Journal Self Citation of internationally reputed journals. OPSEARCH is having less popularity or may not have wider circulation among the scientific community of operation research.

Table V: Comparison between Journal Self Citation (JSC) and Author Self Citation (ASC)

No of Articles	Total Citations (TC)	Journal Self Citations (JSC)	Author Self Citations (ASC)	% of JSC	% of ASC	Ratio of JSC:ASC
70	1843	19	129	1.03	7	1:7

The JSC and ASC is good indicator for the quality of journal. Table 5 indicates that 1.03% Journal Self Citations (JSC) and 7 % Author Self Citations (ASC) which accounts the ratio of 1:7. The low Percentage of Journal Self Citations reveals that the journal is not so much popular among its contributors and user community or it does not convey quality contribution of high standard.

Table VI: Year wise Journal Citation

Period	Total Citation	Percentage%
1726-36	1	0.05
1882-1892	1	0.05
1893-1903	2	0.10
1904-1914	1	0.05
1915-1925	2	0.10
1926-1936	3	0.16
1937-1947	1	0.05
1948-1958	26	1.41
1959-1969	69	3.74
1970-1980	164	8.89
1981-1991	230	12.47
1992-2002	502	27.23
2003-2013	841	45.63

The table above shows the year wise citations. It is noted that the period 2003-2013 and 1992-2002 had the highest citations 841(45.63%) and 502(27.23%) respectively. The maximum numbers of citations were done in these periods. Therefore in 2003-2013 and 1992-2002 maximum scholarly works conducted and published in the field of Operation Research which has played an important role in growth and development of the subject.

Table VII: Average length of articles

Length of articles(pages) Class interval	Midpoint x_i	No of Articles f_i	$f_i x_i$
1-9	5	3	15
10-18	14	47	658
19-27	23	15	345
28-36	32	4	128
37-45	41	0	0
46-54	50	1	50
		$\sum_{i=1}^{N} f_i$ =70=N	$\sum_{i=1}^{N} f_i x_i$ =1196

Mean of $x = \sum_{i=1}^{N} f_i x_i / N = 17.08$

The table shows that Mean length of articles is 17 pages. Length of pages varied from minimum 9 to maximum 54 pages.

TableVIII: Time lag

No of days(class interval)	Midpoint x_i	No of Articles f_i	$Y_i = x_i - 68/15$	$f_i Y_i$
1-15	8	4	-4	-16
16-30	23	23	-3	-69
31-45	38	26	-2	-52
46-60	53	9	-1	-9
61-75	68	5	0	0
76-90	83	1	1	1
166-180	173	1	7	7
271-285	278	1	14	14
		$\sum_{i=1}^{N} f_i$ =70=N		$\sum_{i=1}^{N} f_i Y_i$ = -124

Arithmetic Mean of $Y = \sum_{i=1}^{N} f_i Y_i / N = -1.771$
$Y_i = x_i - 68/15$
Therefore Mean of X $= 68 - 26.56 = 41.43 = 41$
Table 8 shows the time lag which the time is taken between the date of acceptance of a paper and date of online publication of the same paper. Arithmetic Mean time taken between date of acceptance and online publication is 41 days. Time lag varied greatly from minimum 9 to 279 days.

Table IX: Geographical Distribution of Authors of the article

Authors	Number	Percentage (%)
Indian	136	88.31
Foreign	18	11.68

Table X: Geographical Distribution of Foreign Authors of the article

Geographical Area	Number of Authors	Percentage (%)
Egypt	3	16.66
Pakistan	2	11.11
Arabia	1	5.5
China	2	11.11
Singapore	2	11.11
Canada	1	5.5
Korea	1	5.5
Australia	2	11.11
Africa	3	16.66
USA	1	5.5
	18	

In table 9a and 9b shows Geographical distribution of authors and Geographical area distribution among international authors.88.31 % contributions are national and 11.68% are international. Among international contributions major contributions come from Egypt and Africa (16.66%) followed by Pakistan (11.11%), China (11.11%), Singapore (11.11%), and Australia (11.11%).Contributions from European countries are absent in these issues.
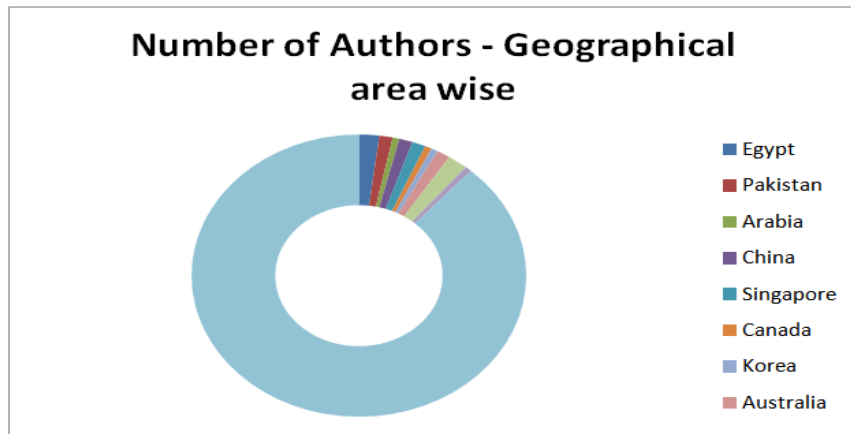

Figure 3 Geographical area wise authorship

IV. SUBJECT TRENDS OF ARTICLES

OPSEARCH covers the subject area business, management and Accounting, Computer Science, Decision Science, Operation Research, Economics. In this study 70 articles covers the diversified subject fields like Dynamic Pricing, Heuristics, Vector Optimization, Linear Programming, Production-Supply Chain, Inventory Control, Lexicographic Search, Capacity Matrix, Tabu Search, Pareto Analysis, Markovian Arrival Process, Fuzzy set , Queue Length, Cluster Analysis, Iterative Algorithm optimization, Logistics and so on. In 8 issues of OPSEARCH thrust area where emphasis has been given are Fuzzy set, Fuzzy demands, Fuzzy Differential Equation, Heuristics, Graph Decision Making, Bi level Programming, and Inventory Control.

V.   CONCLUSION

On the basis of the analysis it is revealed that journal carried articles mostly of group research. Percentage of journal self citation is low, indicating that journal may not be so much popular among its user community. Percentage of Foreign Contributions is quite substantial. Although it is indexed in major abstracting and indexing database it has failed to attract research work of high standard. The increasing trend in the number of contributions in the journal from year to year shows that journal is become important primary publication by researchers in the area. The journal is popular among Indian researcher but failed to gain popularity among international field especially in European countries in the area of operation research. Sponsors have ample scope for improving its quality specially paying much more attention to foreign contributions and reduce the time lag between date of acceptance and date of online publication.

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