Influence of selected factors in journals' citations

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Introduction

Academic journals still play a central role in today's world of science communication with at least three objectives: validation, diffusion, and archival. Therefore, journal publishing should undergo quality control process in order to meet the expectation of the scientific community (Zitt, 2012). Quality control like detection of falsification of results, fraud, plagiarism, etc., is an editorial process and it is quite difficult to determine how ethically and sincerely journal editors are maintaining quality requirements of scientific publications. Numerous methods have been proposed by researchers to determine the quality of scientific publications in alternative way. Among them, peer review method is considered to be the most reliable approach to assess the quality of a research publication by the broad academic community. It, however, has its own limitations like subjectivity, which may result in conflicts of interests, unawareness of quality, or a negative bias against younger people or newcomers to the field (van Raan, 2005). Peer review process is also very expensive and time consuming as the size and ramification of research domains grew beyond manageable limits. These limiting factors of peer review prompted researchers and policy makers to seek other reliable, objective and economical methods where bibliometric indicators based on citation counts offer an obvious alternative, as they provided "unobtrusive measure that do not require the cooperation of a respondent and do not themselves contaminate the response"(Smith, 1981). Policy makers, research funding agencies and university administrators were quick to recognize the practical utility of bibliometric indicators in research evaluation. The citation data got a toehold in the official game of research evaluation when National Science Foundation of United States of America included citation data of Science Citation Index (now Web of Science of Clarivate Analytics) in its *Science Indicator Reports 1972* (De Bellis, 2014). Since then, citation data and bibliometric indicators based on citation counts gained more attentions and gradually their use become widespread in evaluating almost every kind of scientific output. Among the bibliometric indicators used in the evaluation of scientific output, Journal Impact Factor (JIF) introduced by Garfield and Sher (1963) has historically been most utilized in the evaluation of not only scientific journals but also of scientists themselves (Bensman, Smolinsky and Pudovkin, 2010). In recent times, policy makers, funding bodies, particularly from Asia, have

put strong pressures on institutions and authors to publish in journals with JIF that are included either in the Web of Science(WoS) database of Clarivate Analytics or in Elsevier's Scopus although scientific bodies like American Society for Cell Biology(ASCB)has openly called to discard JIF for assessing journals and researchers through the San Francisco Declaration on Research Assessment (DORA) on 2012 (ASCB 2012).The accuracy and usefulness of the JIF have been highly debated since its inception (Latour, 1987; Woolger, 1991; Kostoff 1998, Leydesdorff et al., 2016). Despite the immense popularity of JIF, researchers unearthed some serious limitations that impact its validity (Falagas and Alexiou 2008; Pendlebury 2009; Kumar, 2010; Vanclay, 2012). Studies indicated that distribution of citations to published papers in a journal is highly skewed. A few highly cited papers often account a sizable part of the total citation counts of a journal (Seglen, 1992; Bornman and Leydesdorff, 2016; Lariviere et al., 2016). Thus, a very few highly cited paper can dramatically boost the JIF value of a journal as it calculates the simple arithmetic mean. The meteoric rise of JIF value of *Acta Crystallographica-A* from 2.051 in 2008 to 49.926 in 2009 due to a single paper published in 2008 by G. M. Sheldrick titled 'A short history of *SHELX*' that received 5624 citations in 2009 can be a classic example in this regard (Dimitrov, Kaveri and Bayry, 2010; Sen, 2012). It demonstrated how the use of JIF to judge journal performance can bias the whole evaluation system.

Self-citations of both the authors and journals are two other important limitations that are often discussed in literature as they are very susceptible to manipulations and have high potential to inflate JIF. Author Self Citation (ASC) is generally considered as a normal aspect of scientific communication as it serves an important purpose of displaying the trajectory of thinking of a researcher that has evolved over time and connects the reader to his / her oeuvre. But, human nature being what it is, normative drift inevitably occurs, to greater or lesser extent (Cronin, 2016). Thus, authors may indulge too much in self-citations to amplify the citation impact of their own works. ASC generally peaks within early years (two to three) of publications and papers with more number of authors are likely to get more self-citations (Aksnes, 2003; Davarpanah and Amel, 2009; Kulkarni et al., 2011; Shah, Gul and Gaur, 2015). Thus, excessive ASC can disproportionately affect the total citation counts of a journal when the temporal window is short like in JIF.

Journal Self-Citation (JSC) is a known aspect of reference practices and presence of moderate JSC may indicate that an article is well-suited to a journal (Vanclay, 2013). High rate of journal self-citations may be observed in journals that have a novel or highly specific or regionally relevant topic (McVeigh, 2002; Krell, 2014). However, frequent reports appeared in *Retraction Watch* (https://retractionwatch.com/) and studies indicate that many journal editors employ JSC as a pliable tool to manipulate the JIF of journals (Van Noorden, 2013; Davis, 2017). Citations can be manipulated by publishing editorials with many journal self-citations to its recently published papers (Neuberger and Counsell, 2002). Coercive journal self-citation is another malpractice where editor may request authors of conditionally accepted papers to add references to papers recently published in the journal and it is uncomfortably common and appears to be practiced opportunistically (Straub and Anderson, 2009; Wilhite & Fong, 2012; Opthof, 2013). In response to (anticipated) coercive citation practices, authors may behave strategically by adding references to papers recently published in the journal to which they plan to submit their work, to increase the chance of surviving the (editorial) review process (Chorus and Waltman, 2016; Heneberg, 2016). Thus, the temptation to 'to play the system' can be high as JSC undeniably increase JIF (Krell, 2014).

Recitation is another common referencing practice that can significantly affect citation counts of a work. Recitation occurs when an author cites the same publication more than once, that may or may not be self-citations. Generally, authors in a subject recite authors whom they are devotee/critique or keenly interested in his/her work(s), again and again over other papers in a similar topic (White, 2001; Lu and Wolfram, 2010). Beside the pure intellectual influence / ties, recitation may arise due to simple reason of collegiality or self-interest to cite the work of a friend or colleague. As citations can impact social systems of rewards like promotion/ grant, etc., unholy alliances like 'citation clubs' or 'citation cartels' may be formed (Kostoff, 1998; Opsahl et al., 2008; Davis, 2012; Tang, Shapira and Youtie, 2015) where members may cite each other repeatedly and regularly, omitting relevant important works of other scholars. Large recitations, especially diachronic ones by a few or mutual recitations, indicate either the similarity in cognitive aspects or a possible social ties between the citer and citee (White, 2001). Therefore, disproportionate diachronic recitations of a work not highly cited by others might pose a problem and have great potential to distort the overall citation counts.

In the past, the skewness of citation distribution was studied in details. Other factors like ASC, JSC, etc., in relation to the citation structure of journals, were also emphasized at times.

However, little is known about RC in relation to the citation structure of journals. Moreover, no previous study was conducted to explore the combinatorial effect of these factors on total citation counts of journals.

The present study thus intends

1. to provide a better understanding about the citations distributions of journals representing different ranks.
2. to explore individual as well as unified effect of Author Self-Citations (ASC), Journal Self Citation (JSC) and Recitation (RC) in total citation counts (TC) of the journals representing different ranks.

Methodology

Selection of journals, study period and databases

To illustrate the above points, journals from the subject category of 'Library and Information Science' (LIS) were chosen from Scopus database. SJR SCImago Journal & Country Rank database which was based on Scopus listed 187 journals under the LIS category in the year 2011. Among them, sixteen journals representing different ranks starting from highest to lowest were taken for analysis. Initially all these 187 journals were divided into four tiers according to the average citations received per paper by each journal. Four journals from each tier were taken as given in Table 1. While selecting journals from each tier, efforts were underway to select the journals published from different countries to provide better regional representation and greater variations in data. Here, the publication year 2011 was fixed and the citations window of 2011 to 2014 was taken for analysis. The study was confined to 'research' and 'review' articles published in the selected journals.

Table 1: Selection of Journals

Tier	Avg. Citations per published paper	Name of the Journals (Publishing Country)	Abbreviation Used
I	>4	College and Research Libraries (USA)	CRL
		Library and Information Science Research (Netherlands)	LISR
		Journal of Documentation (UK)	JOD
		Journal of Information Science (UK)	JIS
II	>=3but<4	Aslib Proceedings (UK)	Aslib
		Journal of Web Librarianship(UK)	JWL
		Cataloging and Classification Quarterly(USA)	CCQ
		International Information and Library Review(USA)	IILR
III	>=2 but <3	Archival Science (Netherlands)	AS
		Malaysian Journal of Library and Information Science (Malaysia)	MJLIS
		Archivaria (Canada)	Archivaria
		Performance Measurement and Metrics (UK)	PMM
IV	>=1 but <2	Information Services and Use (Netherlands)	ISU
		Annals of Library and Information Studies (India)	ALIS
		Journal of Map and Geography Libraries (UK)	JMGL
		Scire (Brazil)	Scire

Here, ASC is defined as 'ASC occurs whenever the set of co-authors of the citing paper and that of cited one are not disjoint, that is if these set share at least one common author" (Snyder and Bonzi, 1998). Recitation (RC) occurs when a work is repeatedly cited by an author or a set of authors. Recitation is of two types – *synchronic and diachronic*. When in a single work, another work is repeatedly cited, the recitation is called *synchronic*. *Diachronic* recitation occurs when someone cites the same author in works published at different times. Thus, if *n* is the number of times an author has been cited, the author's recitation count is technically *n – 1* (White, 2001). Here, only *diachronic* recitations were considered.

Establishing a unique identity for author was a great problem earlier as an author may have published papers in different abbreviated names and multiple authors may have identical names in addition to misspellings of names in references. In this study, tools like Scopus author ID, ORCID, author profiles from Google Scholar were used to minimize the error due to ambiguity in names.

The necessary bibliographic details of the published papers in the selected journals along with their citation data for the specified period were collected from Scopus and recorded in

electronic spreadsheet. SPSS software is used for further analysis. Prime data-collection was carried out during June to October 2016.

Hypothesis and its testing

It is hypothesized that total citations received by the journals can significantly be affected by ASC, JSC and RC.

To answer this hypothesis the unified value of ASC, JSC and RC (i.e., ASC ∪ JSC ∪ RC) of the journals are analyzed in relation to Total Citations (TC) received by these journals. Here, the union of ASC, JSC and RC (i.e., ASC ∪ JSC ∪ RC) is termed as Combined Influencing Factors (CIF).

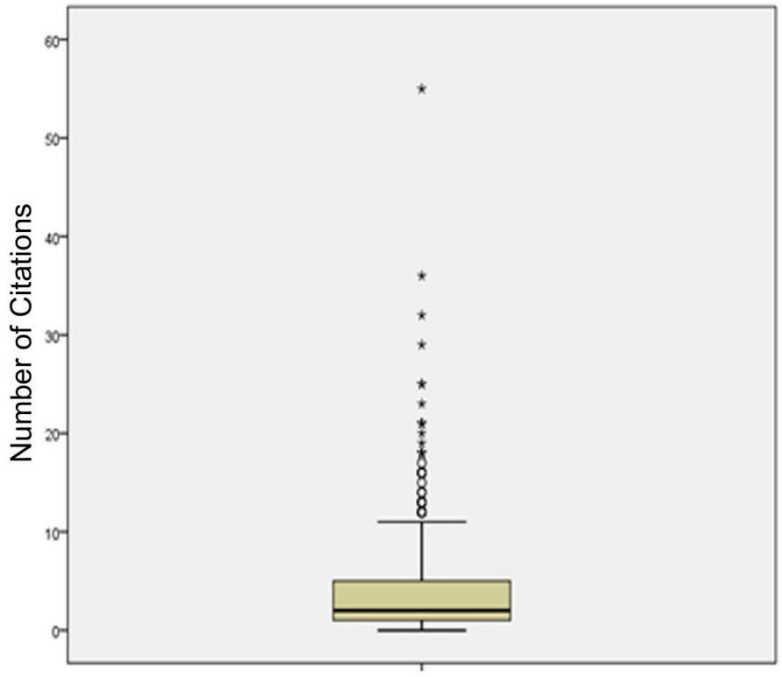
Let P is the probability that a citation is not happened due to CIF

The null hypothesis (H0) is taken as – H0 : P $\leq \frac{1}{2}$

The hypothesis was tested using Asymptotic Score Test for Binomial Proportions. The null hypothesis is accepted when $p < 0.05$ for this test and it signifies that citation is not affected by the CIF.

Results and Discussion

The sample dataset includes 471 papers that received a total of 1959 citations. Among them, 91 papers (~20%) remain uncited during the period of study. The mean citation rate per paper is 4.16 with standard deviation 5.521. The median is 2.



The box plot of the distribution of citations presented in Figure 1 has shown that a number of outliers are above the upper whisker. These are papers (34 in all) with more than 11 citations. The maximum citation is recorded for a paper published in LISR with 55 citations. Further, it is observed that 10% of the total papers that are top cited contributed about 40.23% of the total citations. Table 2 gives a further insight of citation distributions at journal level.

Table 2. Citation distribution of journals

Journal	Published papers	Uncited papers	Average citations per paper	Citation range	Standard deviation	Skewness	Share of T10*	S-W Test for Log Normality (p>0.05)
Tier -I								
CRL	30	1 (3.33%)	9.8	0 – 32	8.15	1.252	29.25%	0.482
LISR	37	1 (2.7%)	7.87	0 – 55	9.464	3.514	37.8%	0.234
JOD	43	2 (4.65%)	6.44	0 – 36	5.707	3.325	26.71%	0.493
JIS	51	3 (5.88%)	5.92	0 – 25	5.218	1.684	30.46%	0.136
Tier -II								
Aslib	36	4 (11.11%)	3.67	0-18	3.727	2.049	36.36%	0.035
JWL	28	9 (32.14%)	3.29	0-23	4.94	2.673	48.91%	0.140
CCQ	36	7 (19.44%)	3.22	0-14	3.28	1.357	35.34%	0.006
IILR	28	6 (21.43%)	3.07	0-21	4.242	3.022	41.86%	0.012
Tier -III								
AS	21	9 (42.86%)	2.81	0-10	3.26	3.341	32.2%	0.613
MJLIS	28	6 (21.43%)	2.79	0-9	2.998	0.951	33.33%	0.001
Archivaria	14	6 (42.86%)	2.21	0-8	2.65	2.71	38.89%	0.302
PMM	15	5 (33.33%)	2.20	0-10	2.76	2.859	48.48%	0.118
Tier -IV								
ISU	30	14 (46.67%)	1.8	0-21	4.061	4.131	64.81%	0.001
ALIS	36	11 (30.56%)	1.639	0-5	1.475	1.496	28.81%	0.001
JMGL	20	5 (25%)	1.6	0-7	1.562	1.603	31.25%	0.010
Scire	18	2 (11.11%)	1.278	0-5	1.044	1.074	30.43%	0.001

*T10 – Top ten percentage papers ranked by the number of citations received
** S-W test - Shapiro-Wilk's test for normality after log transformation of citation count value

It is found from Table 2 that *Tier -I* journals have very low numbers of uncited papers whereas low tier journals have greater number of uncited papers. About six journals from *Tier II* to *Tier IV* have about one third or more of total papers remain uncited with a maximum uncitedness of 46.67% of papers of ISU. On the other hand, contributions of 10% top cited papers in total citation counts have shown that they have contributed more than one

third of total citations in ten journals and around half or more than half of total citations in four journals with a maximum of 64.81% for the journal ISU. The citations range, standard deviation and skewness measure along with uncited and top cited paper reveals that distribution of citations in journals are highly skewed in nature and few top papers have lion's share in total citation counts. Moreover, the Shapiro-Wilk's test ($p>0.05$) and the normal Q-Q plots of logarithmic transformation of citations data indicate that a considerable part of the citations distribution of about eight journals more likely follow lognormal distribution. Among them, the top tier journals have more inclinations towards lognormal distribution. These findings are in line with several earlier studies (Redner, 2005; Radicchi, Fortunato and Castellano, 2008; Chatterjee, Ghosh and Chakrabarty, 2016).

Authorship pattern and citation structure

Of the 471 papers, single authorship accounted for 193 papers (~ 40.98%) and remaining 278 papers (~59.02%) are the result of team effort. On average each paper is produced by a team of 2.07 authors with standard deviation 1.205. The median is 2. The maximum value recorded is for a paper published in ISU with seventeen authors. Besides, there are only eight papers in the dataset with more than five authors and therefore, they are grouped with five authors and named as 5 or 5+ authors. Table 3 reflects the authorship pattern and the citation structure.

Table 3 Authorship pattern and citation structure

Number of authors	Number of papers	Number of uncited papers	Total citations	Mean (±SD)	Citation range
1	193	55 (28.5%)	627	3.25 (±4.327)	0-29
2	148	19 (12.83%)	669	4.52 (±5.217)	0-32
3	80	11 (13.75%)	383	4.79 (±7.296)	0-55
4	30	4 (13.33%)	175	5.83 (±7.33)	0-36
5 or 5+	20	2(10%)	105	5.25(±5.848)	0-21

There is a common notion that an increase in the number of co-authors in papers can lead to an increase in impact as the interaction of increasing number of co-authors facilitates sharing of knowledge, ideas and experiences and thus, has a higher potential to enhance the quality of the paper. Rousseau (1992) argued using Bayesian approach that multi-authored papers are likely to be more cited than single-authored papers. The validity of his argument has also been empirically tested and it has been found that co-authored publications are more likely to achieve above average visibility and impact (Bordons, Aparicio and Costas, 2013; Abramo and D'Angelo, 2015). Here, it is observed that papers with solo authors have highest percentage of uncited papers and papers with five or more authors have lowest percentage of uncited articles. But, it can't be ascertained that increased number of authors in papers always can lower the number of uncited papers as papers with two authors have lower uncitedness than papers with three and four authors.

The mean values given in Table 3 largely indicate that the addition of an author can lead to increased number of citations. There is a significant increase in the average value of citations per paper from single authored papers to double authored papers and thereafter almost a linear growth of citations is observed up to papers with four authors. But, the mean citation rate for papers with five or more authors is somewhat less than the papers with four authors.

However, the plot of authorship vs mean citations rate at tier level given in Fig.2 indicates that top tier journals (i.e., *Tier I*) follow a linear growth of citations with the addition of co-authors in the papers. But, the citations trends of relatively low tier journals are very irregular and oscillating in nature with increasing co-authors in the papers.

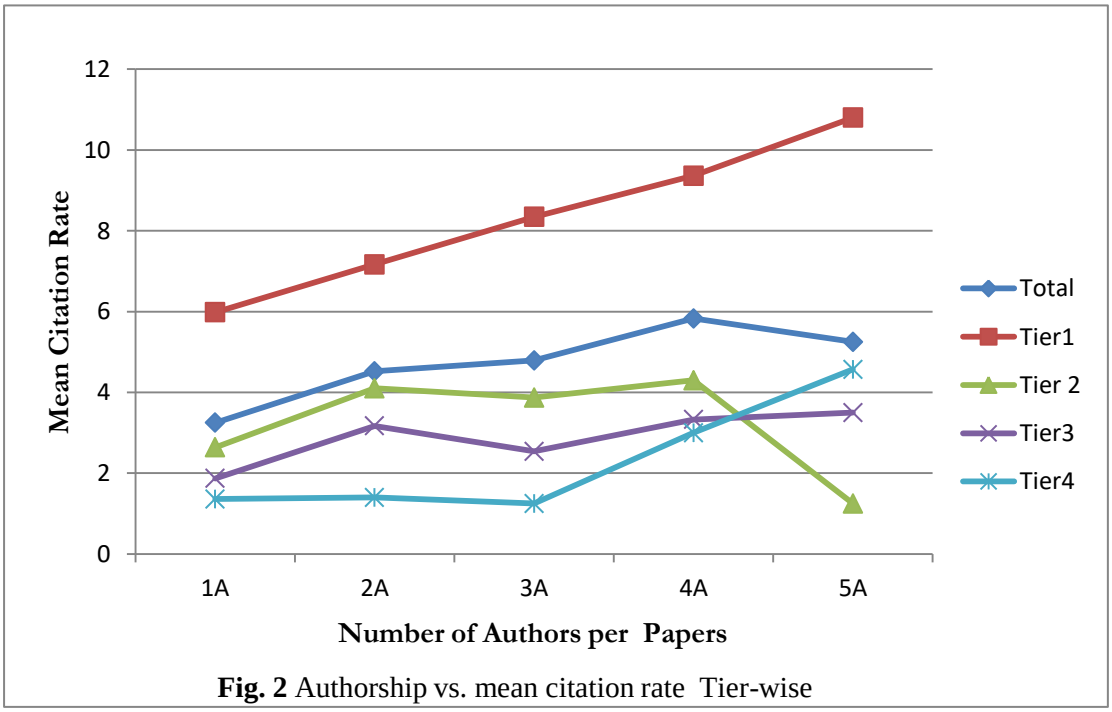


Fig. 2 Authorship vs. mean citation rate Tier-wise

It may be inferred from these somewhat surprising results that productivity of authors involved in multi authored paper may not always follow the number of paper citing them on an average (Glänzel and Thijs, 2004). But the results also give adequate space for raising the doubt of Honorary/ Guest authorship phenomenon which is a concern in scholarly publications (Wilsar et al., 2011; Bavedkar, 2012).

Authorship and Author self-citations (ASC) structure

Out of total 471 papers in this dataset, 91 papers remain uncited. Of the remaining 380 papers, 40% (i.e., 152) have one or more author self-citations (ASC) and ASC shares 13.58% of total citations. Studies have shown that multi authored papers are likely to be more self-cited than their individual counterpart as there are more authors to cite themselves (Aksnes,

2003; Glänzel and Thijs, 2004; Van Raan, 2008).Authorship vs. author self-cited papers given in Table 4 depicts that percentage of self-cited papers follows an upward trend from single authored papers to papers with four authors. There is a slight decrease in the percentage of self-cited papers from papers with four authors to papers with five or more authors.

The mean value of ASC per paper shows that it follows an upswing trend with increasing number of co-authored papers. As multi-authored papers have higher number of total citations, share of ASC in total citations are taken to understand the extent of contribution made by ASC in total citations. The upward trend is also observed here except for the papers with four authors where the percentage of ASC is little bit less than for papers with three authors.

Table 4. Authorship pattern and self-citation structure

Number of authors	Number of cited papers	Number of self-cited papers	Total citations	Avg. ASC	ASC as % of total citations
1	138	47 (34.06%)	627	0.529	73 (11.64 %
2	130	51 (39.23%)	669	0.715	93(13.9 %)
3	69	31 (44.93%)	383	0.783	54(14.1 %)
4	26	14 (53.84%)	175	0.885	23 (13.14 %)
5 or 5+	17	9 (52.94%)	105	1.353	23 (21.9%)

Citation range and Author self-citation

Table 5 express the citation distribution of 380 papers that have received at least one citation. It is observed that majority of the papers have citations range between 1-3. On the other extreme there are 29 papers that received more than 12 citations per papers. The mean author self-citing rate along with share of author self-cited papers strongly indicate that highly cited papers tend to be more frequently self-cited rather than its low cited counterpart. It is also observed that proportion of self-citation to total citations is highest for papers with citation range of 1-3 and lowest for papers having citations more than twelve. But, it can't be ascertained that proportion of self-citation to total citations follow an inverse relation as demonstrated by earlier studies (Aksnes, 2003; Leblond, 2012) as there is an increase in share of self-citations from citation range 4-6 to 10-12.

Table 5. Citation range and self-citation trend

Citation range	Number of papers	Total citations	Number of ASC papers	Number of ASC	Mean ± SD (Min –Max)
1-3	192 (50.53%)	337	44 (22.92%)	68 (20.18%)	0.354 ±0.614 (0-2)
4-6	95 (25%)	455	37 (38.95%)	58 (12.75%)	0.611 ±0.971 (0-5)

7-9	40(10.53%)	319	22 (55%)	43 (13.48%)	1.075 ±1.228 (0-4)
10-12	24(6.32%)	260	16 (66.67%)	39 (15%)	1.625 ±1.439 (0-5)
>12	29(7.63%)	588	21 (72.41%)	50 (8.50%)	1.724 ±1.907 (0-6)

Currency and self-citation

Self-citation whether in the form of author self-citation (ASC) or journal self-citation (JSC) is a kind of self-promotion /self-advertisement that are generally given earlier after publication than foreign citations (Glänzel, Thijs and Schlemmer, 2004; Davarpanah and Amel, 2009). Prior studies have shown both ASC and JSC peaked about two years after publication and then declined progressively thereafter (Kulkarni et al., 2011, Heneberg, 2016). It is observed from Fig. 3 that there is a sharp rise in ASC in the post publication year 1 from the publication year. In post publication year 2, it is almost at par with the post publication year 1 and thereafter it shows a down trend. Similarly, JSC peaked about two years after publication and then it declined. The unified count of JSC and ASC (i.e., ASC □ JSC) denoted by Total Self Citation (TSC) is also seen to have reached its peak in the second year from the publication year. The share of TSC to that of total citations is found to have crossed 50% mark in the publication year and thereafter it decrease as the share of foreign citations increases. These findings implicate that self-citation could be problem when short citation window is used to evaluate a journal like in JIF (Yu and Wang, 2007; Frandesen, 2007).

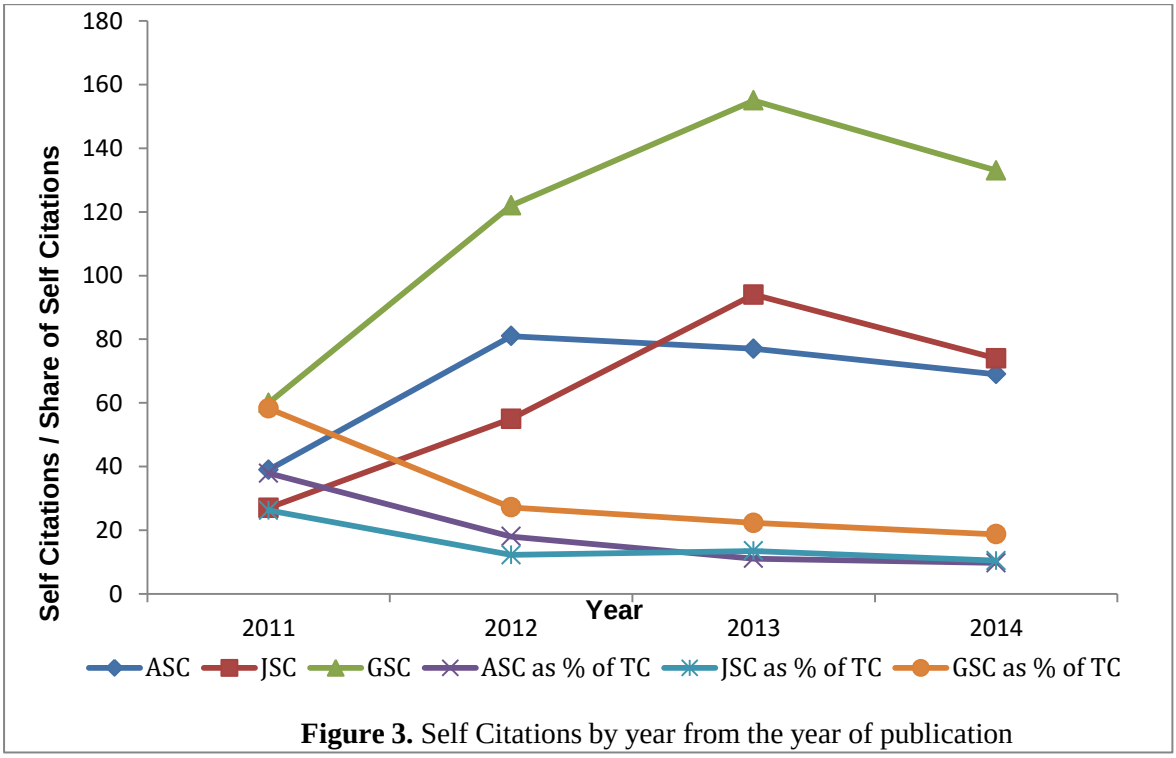


Figure 3. Self Citations by year from the year of publication

Recitations (RC)

Recitation can happen only when a paper receives at least two citations. Here, 288 papers receive two or more citation with a total of 1867 citations. Among these papers, 144 (50%) papers have received recitations with a total of 300 (~16.07%) citations. Recitation does not increase the reach of a paper. Thus, disproportionate higher recitations by a few may strengthen the doubt of having possible social ties between the citing and cited author. But, citation exegesis of the recitations phenomena would be naïve unless one has insider knowledge of the milieux of the authors involved in cited and citing papers (Cronin and Shaw, 2002). However, the examination of nature of recitations for individual papers in this dataset reveals that many papers received large number of citations due to recitations by a few. For instance, the two top recited papers reveal the following-

a. The highest number of recitations is recorded for a paper published in ISU with 14 recitations and that paper receives a total of 21 citations. The paper is published by five authors from National Library of Medicine, USA. The total number of authors in the citing set of papers is 83. Total number of unique authors (i.e., without repetition) is 45. The paper got five recitations as self-citations. Eight recitations received from a set of authors where two authors are common and they are from University of Maryland School of Medicine and Mayo Clinic, USA.

b. The next highest recitation received by a paper by Prof. Wolfgang Glänzel from KU Leuven published in JIS. It receives 11 recitations out of a total of 18 citations. The total number of unique authors is 23 out of total 51 authors set in the citing set of papers. The paper is recited seven times by a set of authors where Prof. Javier Ruiz-Castillo from Universidad Carlos III, Spain is a common author. Similarly, it was recited three times by another set of authors where Domenico A. Maisano and Luca Mastrogiacomo from Politecnico di Torino, DIGEP , Italy are common authors.

High recitations by a few do not necessarily imply that some kinds of nepotism take place. There might be the following reasons for high recitations –

- Re-use of accumulated set of references requires less efforts to process them and prolific authors usually held them in their long term memory once they get affected by the ideas contained in the paper.
- If the very prolific authors were to continue to work on the same topic one would expect higher recitations(Milojević, 2012).
- High ‘socio-cognitive’ compactness in certain fields/ topics may lead to higher recitations

But, it cannot be said with certainty, what has actually happened behind as Cronin (2016) aptly says “the selection of citations by an author is a residually (and necessarily) subjective act, impossible to predict or second guess with certitude”.

Pearson Correlation test result (r=0.652; p<0.01; n= 288) between recitations and total citations received by the papers, reflected that there exists a statistically significant correlation between RC and TC.

Combined effect of ASC, JSC and RC

Of the 1959 citations, ASC accounted for 266 citations (13.58%), JSC accounted for 250 citations (12.76%) and RC accounted for 300 citations (15.31%). As self-citations both in the form of ASC and JSC can be manipulated with relative ease, their union TSC was taken to examine its potential to affect the TC. Similarly, union of ASC, JSC and RC i.e., Combined Influential Factors (CIF) was also taken into account to study the combined effect of these three influential factors in the share of TC. The TSC is estimated as 471 citations and it shares 24.04% of TC and CIF contributes 653 citations (33.33%) in TC.

In addition, Pearson Correlation test was conducted between the total citation count and quantity of these influential factors at their individual and combined level to understand the strength of correlation between them.

Table 6. Correlation between TC and ASC, JSC, RC, TSC and CIF

	Influential Factors	Pearson *r* **	*Value of n**
Total Citations	ASC	0.420	380
Pearson Correlation	JSC	0.402	380
Sig (2tailed)	RC	0.687	380
	TSC	0.538	380
	CIF	0.712	380

**Correlation is significant at the 0.01 level (2-tailed).
* *n* is the number of papers received at least one citation.

The Pearson *r* value given in Table 6 indicates that association of all these influential factors i.e., ASC, JSC and RC with TC at individual level are statistically significant and the strength of statistical association follows the order as RC>ASC> JSC.

Though the strengths of association of ASC and JSC with TC are somewhat lower at individual level, their union (i.e., TSC) exerts stronger statistically association with TC. Similarly, the Pearson *r* value for CIF indicates that the union of these factors poses strongest association with TC than their individual counterpart.

Further, examination of the contribution of ASC, JSC and RC at their individual and combined level to total citations for individual journal given in Table 7 reveals the following.

a. Though the average value of ASC, JSC and TSC per paper is relatively higher in top tier journals (except some cases like JSC of journal AS), but percentage of

their contribution in TC is relatively lower as top tier journals have higher average citations per paper. But due to poor average citation of low tier journals like AS, Scire and JMGL, TC of these journals were relatively more affected by TSC. The fact that low visibility goes with high self-citation shares seems, however, to be plausible (Glänzel, Thijs, & Schlemmer, 2004). Examination of the excessive JSC received by Scire and JMGL revealed that the editor of the corresponding journal wrote article where they have referred a number of papers from their journals. Therefore, it strengthens the doubts of artificially raising the number of citations.

b. Average number of RC is much higher for top tier journals with greater average citations per paper. It seems very plausible that preferential attachment of productive authors to the central journals in a subject may lead to higher recitations. It is also observed that recited articles of these journals are recited by more number of authors than the recited articles of lower tier journals. Recitation by more number of authors speaks about quality of the paper whereas higher recitations by few or higher self-recitation indicates either the idea contained in the paper is intellectual secluded or citations are being the result of a kind of social ties.
c. The average CIF value indicates that at least two citations per paper in *Tier-I* journals come from these influencing factors. But due to large number of citations received by these journals, the p_{value} remains significant indicating the acceptance of the null hypothesis of this study i.e., total citations received by these journals are not significantly affected by CIF though more than one third of citations received by two journals i.e., JOD and JIS due to CIF.

For the other 12 journals that are from *Tier -II* to *Tier IV,* it is observed that the average CIF value crosses 1.0 in three journals and in another four journals it is over 0.9. The percentage data show that CIF contributes one third or more of TC in 9 journals, with a maximum of 65.22% in Scire . The p_{value} of *Tier -II* journals indicates that total citations count is hardly affected by these influencing factors as the contribution of CIF in TC is relatively less and total citations count are relatively higher in these journals. Whereas due to poor TC and higher CIF of eight journals of *Tier –III and Tier IV*, p_{value} for these journals becomes higher signaling the rejection of null hypothesis. This implies that the influencing factors play the significant role in total citation counts of these journals. Therefore, it can safely be inferred that journals with poor average citations per paper are more likely to be affected by these influencing factors.

Table 7. Contribution of Author Self-Citations (ASC), Journals Self-Citations (JSC and Recitations (RC) to Total Citations (TC) count of Journals

Journals	*Papers published*	*% of un-cited papers*	*Avg. cit. per paper*	*Avg. JSC per paper*	*JSC as % of TC*	*Avg. ASC per paper*	*ASC as % of TC*	*Avg. RC per paper*	*RC as % of TC*	*Avg. TSC[+] per paper*	*TSC as % of TC*	*Avg. CIF per paper*	*CIF as % of TC*	*Score test p≤0.05*
Tier -I														
CRL	30	3.33	9.80	0.83	8.50	0.50	5.10	1.03	10.54	1.20	12.24	2.00	20.41	*
LISR	37	2.70	7.87	0.68	8.59	0.92	11.68	1.19	15.12	1.51	19.24	2.24	28.52	*
JOD	43	4.65	6.44	0.77	11.91	1.12	17.33	0.91	14.08	1.67	25.99	2.16	33.57	*
JIS	51	5.88	5.92	0.61	10.26	0.88	14.9	1.31	22.09	1.41	23.84	2.29	38.74	*
Tier -II														
Aslib	36	11.11	3.67	0.28	7.58	0.81	21.97	0.61	16.67	0.97	26.52	1.93	34.85	*
JWL	28	32.14	3.29	0.61	18.48	0.25	7.61	0.32	9.78	0.68	20.65	0.93	28.26	*
CCQ	36	19.44	3.22	0.69	21.55	0.08	2.59	0.25	7.76	0.75	23.28	0.92	28.45	*
IILR	28	21.43	3.07	0.07	2.33	0.39	12.79	0.29	9.30	0.43	13.95	0.61	19.77	*
Tier -III														
AS	21	42.86	2.81	1.00	35.59	0.48	16.95	0.43	15.25	1.38	49.15	1.52	54.24	0.742
MJLIS	28	21.43	2.79	0.29	10.26	0.64	23.08	0.64	23.08	0.82	29.49	1.18	42.31	0.087
Archivaria	15	42.86	2.21	0.21	9.68	0.50	22.58	0.29	12.90	0.71	32.26	0.86	38.71	0.104
PMM	14	33.33	2.20	0.53	24.24	0.47	21.21	0.27	12.12	0.80	36.36	0.80	36.36	0.058
Tier -IV														
ISU	30	46.67	1.80	0.03	1.85	0.47	25.93	0.70	38.89	0.50	27.78	0.97	53.70	0.705
ALIS	36	30.56	1.64	0.36	22.03	0.28	16.95	0.31	18.64	0.53	32.20	0.69	42.37	0.121
JMGL	20	25.00	1.60	0.80	50.00	0.25	15.63	0.20	12.50	0.95	59.38	0.95	59.38	0.855
Scire	18	11.11	1.28	0.67	52.17	0.17	13.04	0.00	0.00	0.83	65.22	0.83	65.22	0.927

* *p* almost tends to zero and thus significant; [+] TSC –Total Self Citation (ASC □ JSC); CIF- Combined Influential Factors (ASC □ JSC □ RC)

Conclusions

This study of sixteen Scopus index journals representing different ranks largely confirms that distributions of citations in these journals are highly skewed. The nature of skewness of citations distribution is relatively greater for journals with higher average citations per paper. Thus, papers of high impact journals should not be always considered as better as many of them may not attract adequate attention of contemporary researchers. Therefore, publishing a paper in high ranking journal should not be one of the base criteria for evaluating a researcher.

The study also reveals that self-citation both in the form of author self-citation and journal self-citation can affect the total citation counts of a journal when the temporal window for citation counts is short like only two years for JIF. The results indicate higher ranked journals having large number of total citations are less affected by self-citations whereas journals with poor average citations per paper have increased likelihood of being affected by higher self-cited rate.

Recitation is found to be higher for papers published in top ranked journals. The significant presence of recitations in total citations count also indicates that it can definitely play a role in citation based indicators. Therefore, further investigation on recitation is essential to explore more on nature of recitation that may have been employed artificially to raise the citations count of a journal as this is almost an overlooked factor in bibliometric research.

Moreover, self-citation and recitations may not directly play a significant role in total citation counts of top tier journals as seen from the findings, but they can play a role in attracting more citations. Because, having larger citations initially by the papers help them to better optimize in search engine results and therefore probability of getting these papers in top of the list in search results of search engines remain higher (Beel, Gipp and Wilde, 2010; Norman, 2012). Research has shown that scientists often cite material to which they are readily exposed (Hecht, Hecht and Sandberg, 1998) and these papers are generally in the top of the list in search results. Therefore, further research is needed to unearth how effective the highly self-promotional/ recited papers are in attracting more citations to the primary research they refer to.

To conclude that the popular bibliometric indicators like JIF which is based on simple citation counts are very much influential in shaping the science and publications pattern. The present study has shown that simple count of citations could not serve as unbiased indicator or could provide adequate protection against unethical behaviour of inflating citations through self-citations or recitations. As these factors can be manipulated with relative ease, an alternative indicator is needed to be developed either to minimize their effect on the indicator or allowing their efficient elimination.

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