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Abstract

Purpose – The purpose of this paper is to analyse the author self-citation behavior in the field of Library and Information Science. Various factors governing the author self-citation behavior have also been studied.
Design/methodology/approach – The 2012 edition of Social Science Citation Index was consulted for the selection of LIS journals. Under the subject heading "Information Science and Library Science" there were 84 journals and out of these 12 journals were selected for the study based on systematic sampling. The study was confined to original research and review articles that were published in select journals in the year 2009. The main reason to choose 2009 was to get at least five years (2009-2013) citation data from Web of Science Core Collection (excluding Book Citation Index) and SciELO Citation Index. A citation was treated as self-citation whenever one of the authors of citing and cited paper was common, i.e., the set of co-authors of the citing paper and that of the cited one are not disjoint. To minimize the risk of homonyms, spelling variances and misspelling in authors' names, the authors compared full author names in citing and cited articles.
Findings – A positive correlation between number of authors and total number of citations exists with no correlation between number of authors and number/share of self-citations, i.e., self-citations are not affected by the number of co-authors in a paper. Articles which are produced in collaboration attract more self-citations than articles produced by only one author. There is no statistically significant variation in citations counts (total and self-citations) in works that are result of different types of collaboration. A strong and statistically significant positive correlation exists between total citation count and frequency of self-citations. No relation could be ascertained between total citation count and proportion of self-citations. Authors tend to cite more of their recent works than the work of other authors. Total citation count and number of self-citations are positively correlated with the impact factor of source publication and correlation coefficient for total citations is much higher than that for self-citations. A negative correlation exhibits between impact factor and the share of self-citations. Of particular note is that the correlation in all the cases is of weak nature.
Research limitations/implications – The research provides an understanding of the author self-citations in the field of LIS. readers are encouraged to further the study by taking into account large sample, tracing citations also from Book Citation Index (WoS) and comparing results with other allied subjects so as to validate the robustness of the findings of this study.
Originality/value – Readers are encouraged to further the study by taking into account large sample, tracing citations also from Book Citation Index (WoS) and comparing results with other allied subjects so as to validate the robustness of the findings of this study.

Keywords Citations, Citation analysis, Author self-citations, Library and information Science, Self-citations
Paper type Research paper

Introduction

Self-citation refers to a situation where citing and cited works have an association either at their author's level or at the journal level. If there is non-disjoint set of authors in citing and cited works, it is called author self-citation, and where both are published

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in same journal, it is referred to as journal self-citation. Both forms of citations are common in the scholarly world and have attracted attention of scholars around the world to debate their existence and argue their validity. Author self-citations – a common practice in scholarly publications (Dimitroff and Arlitsch, 1995) – form a significant proportion of citations (Aksnes, 2003), researchers point valid reasons for such act though wrongful behavior cannot be ignored. The optimistic view held by many include: authors refer to their previously published papers to build a connection between current and previous work so as to avoid repetition of information, arguments or experiential setups that are already been discussed in previous works (Tagliacozzo, 1977; Kovacic and Misak, 2004; Brown, 2009). Acknowledging one's own contribution to the advancement of the research topic in question is considered by Glanzel *et al.* (2006) an important reason for giving self-citations. In addition it will be inevitable when the published data in a specific field are solely the work of citing authors (Gami *et al.*, 2004) or when the publications are the result of a series of consecutive efforts in a specific research field (Falagas and Kavvadia, 2006).

A number of studies have been conducted to study the phenomena of authors' self-citations in different disciplines, specific subject fields or particular geographical area. We have figured only the study of Dimitroff and Arlitsch (1995) which had thoroughly deliberated on authors' self-citation in the field of Library and Information Science. There are also few other authors (Cline, 1982; Raptis, 1992) who briefly discuss this issue in the field of LIS. Irrespective of their profundity, such studies have either observed self-citation frequency at article level or proportion of articles with self-citation and no attempt has been made to evaluate self-citations in relation to total citation count or to emphasize its association with parameters like authorship strength, reputation of source publication etc. In fact, Dimitroff and Arlitsch (1995) suggest readers to further their study by examining relationship of self-citations to other citations so as to provide a broader picture of self-citing practices in Library and Information Science field. To bridge this gap, the current study is first of its kind in the field of Library and Information Science where author's self-citation behavior is observed in relation to total citation count, authorship strength, citation recency and reputation of source publications.

Literature review

Self-citations are considered a natural phenomenon in knowledge dissemination by bibliometric scholars. Lack of self-citations over a long-term period is just as pathological as a high proportion of self-citations (Glanzel *et al.*, 2004; Lin and Huang, 2012). Besides, it is a daunting task to discriminate genuine self-citations from what Martyn (1975) calls "frivolous" and Lawani (1982) tags dubious form of self-aggrandizement. Kovacic and Misak (2004) regard that it is impossible to determine the level of authors' integrity with regard to self-citation.

At journal level, they are said to manipulate the indices which reflects the prestige and reputation of journals, like Journal Impact Factor (JIF), h-index, etc. But there is no universal consensus on exact influence; studies have shown that the degree of correlation between journal self-citation and indices varies across subject fields. While some report strong positive correlation (Herbertz, 1995; Fassoulaki *et al.*, 2002), others find poor relation (Motamed *et al.*, 2002; Fan and McGhee, 2008), or of least statistical significance (Frandsen, 2007; Huang and Lin, 2012), while some suggested that the influence varies from journal to journal, and also has to do with their reputation, i.e., journals with high impact (JIF or h-index) are least influenced by self-citations

and vice versa (Fassoulaki *et al.*, 2000). Lliev (2013) advocate the introduction of an upper limit on the number of self-citations which should be regarded as natural/ordinary citation. If self-citations exceed this limit, the self-citation should be reduced to or neglected at all. Garfield (1979) is also of the view that unjustified self-citations are apparent to readers and should be corrected in the editorial and peer review process.

Author self-citations have been reported through a number of important studies (Tagliacozzo, 1977; Lawani, 1982; Aksnes, 2003; Gami *et al.*, 2004; Davarpanah and Amel, 2009). Glanzel *et al.* (2004) have also studied the author self-citation in scientific communication. Author self-citation in medical literature has been studied by Kovacic and Misak (2004). The intricacies of author self-citations have been also studied (Pichappan and Sarasvady, 2002). Dimitroff and Arlitsch (1995) studied the self-citation rate of authors in the Library and Information Science literature. It was found that 50 percent of the articles contained at least one self-citation and articles with multiple authors were all more likely to have higher self-citation rates. The phenomenon of citation increase in relation to addition of authors has also been studied by other researchers (Snyder and Bonzi, 1998; Glanzel, 2002; Aksnes, 2003; Davarpanah and Amel, 2009; Costas *et al.*, 2010). Higher self-citation rates in multi-authored papers than single-authored papers have also been observed by Leimu and Koricheva (2005). However, studies by Tagliacozzo (1977) and Hutson (2006) could not ascertain any relationship between self-citation behavior and author increase. Glanzel and Thijs (2004) also show that at the macro-level multi-authorship does not result in any exaggerate extent of self-citations.

Various studies have been carried over to ascertain a relationship between proportion of self-citations and total citation count. Studies by Aksnes (2003), Hutson (2006), Costas *et al.* (2010) and Leblond (2012) report inverse relationship between proportion of self-citations and total citation count.

Aksnes (2003) observes that the percentage of self-citations decreases when citations are traced for longer periods. Other studies have also found that authors tend to cite more of their recent works than the work of other authors (Aksnes, 2003; Leimu and Koricheva, 2005; Costas *et al.*, 2010). Davarpanah and Amel (2009) also reveal that share of self-citation decreases with growing time window.

Kovacic and Misak (2004) found that articles published in highly cited journals had a smaller proportion of author self-citations than articles published in less-cited journals. Gami *et al.* (2004) also observe a negative relationship between the journal quality and share of self-citations. Medoff (2006) while observing the self-citation phenomenon in economics reveals that self-citations that appear in prestigious high-impact economics journals have a statistically positive, but numerically small, effect on a subsequent article's total citation count and on the quality of the citing journal.

Methods

We consulted the 2012 edition of Social Science Citation Index for the selection of LIS Journals. Under the subject heading "Information Science and Library Science" there were 84 journals and out of these 12 were selected for the study. The selection was based on systematic sampling technique wherein 84 LIS journals represented the whole population and sample size was chosen to be 14 percent, i.e., 12 journals ($n = 84/12 = 7$). To begin with, journals were arranged in descending order of their impact factor (2012). Journal at serial number four was randomly chosen as the starting point and preceded with the selection of every seventh journal in the list. As such, 12 journals were selected for the study (Appendix).

The study was confined to "original research" and "review articles" published in select journals in the year 2009. The main reason to choose 2009 was to get at least five years (2009-2013) citation data. Citations were tracked from Web of Science Core Collection (excluding Book Citation Index) and SciELO Citation Index. We applied the same definition of self-citation as adopted by Snyder and Bonzi (1998), Aksnes (2003) and Glanzel *et al.* (2004). A citation was treated as self-citation whenever one of the authors of citing and cited paper was common, i.e., the set of co-authors of the citing paper and that of the cited one are not disjoint. To minimize the risk of homonyms, spelling variances and misspelling in authors' names, we compared full author names in citing and cited articles.

In select 12 journals, a total of 471 articles were published in 2009. As of February 1, 2015, only 342 articles have received a minimum of one citation each while 129 articles remain uncited (Appendix). Since the main focus of study was to assess self-citations, we excluded uncited articles from our study. Thus, the study was based on the analysis of the remaining 342 articles. For each cited article, the necessary bibliographic details along with citation data were collected and recorded in SPSS software for further analysis.

Findings

Authorship pattern and citation behavior

Of the 342 articles, 73.68 percent (252) are result of team efforts and the remaining 26.32 percent (90) are produced at individual level. They have received a total of 2,032 citations with 252 as self-citations. On an average, each article is produced by a team of 2.36 authors (SD±1.23) and received 5.94 citations (SD ± 6.91): 0.74 self-citations (SD±1.24) and 5.20 other citations (SD±6.49). From Table I it is clear that a maximum of 113 articles is produced in a team of two authors, and maximum team strength of 11 authors are found in one article only.

A number of studies testify that with an addition of author, there is an increase in the number of self-citations (Dimitroff and Arlitsch, 1995; Snyder and Bonzi, 1998; Glanzel, 2002; Aksnes, 2003; Davarpanah and Amel, 2009; Costas *et al.*, 2010). Higher self-citation rates in multi-authored papers than single-authored papers have also been observed by Leimu and Koricheva (2005). Every author comes with his/her own experience and subject knowledge resulting in enrichment of paper quality. And also the probability of citing one's own articles in future publications also increase with the increase in the number of co-authors. With this assumption, we performed Pearson Correlation test between the number of authors and total number of citations and also in between number of authors and number/share of self-citations. Table II

Number of authors	Number of articles	Articles with self-citation	Mean ± SD; median (minimum–maximum) Total number of citations	Number of self-citations
1	90 (26.32%)	22 (24.44%)	4.43 ± 5.22; 2 (1–28)	0.39 ± 0.80; 0 (0–3)
2	113 (33.04%)	50 (44.25%)	6.09 ± 7.45; 4 (1–45)	0.96 ± 1.56; 0 (0–9)
3	93 (27.19%)	39 (41.94%)	6.26 ± 5.89; 5 (1–34)	0.75 ± 1.08; 0 (0–4)
4	28 (8.19%)	15 (53.57%)	9.25 ± 10.38; 6 (1–43)	0.93 ± 1.27; 1 (0–5)
5	12 (3.51%)	3 (25%)	6.17 ± 2.50; 2.5 (1–27)	0.42 ± 0.79; 0 (0–2)
6	5 (1.46%)	4 (80%)	5.80 ± 7.53; 2 (1–19)	1.60 ± 1.95; 1 (0–5)
11	1 (0.29%)	0 (0%)	1	0

Table I. Authorship pattern and citation behavior

reflects a positive correlation between number of authors and total number of citations ($r = 0.116$; $p < 0.05$; $n = 331$). However, no correlation exists between number of authors and number/share of self-citations, i.e., self-citations are not affected by the number of co-authors in a paper. This result is in conformity with the findings of Tagliacozzo (1977) who observes no relationship between the extent of self-citations and the number of co-authors in the fields of plant physiology and neurobiology. Hutson (2006) also could not ascertain any relation in archeology papers. Glanzel and Thijs (2004) also show that at the macro-level multi-authorship does not result in exaggeration of self-citations. However, the studies carried out by Dimitroff and Arlitsch (1995), Snyder and Bonzi (1998), Glanzel (2002), Aksnes (2003), Davarpanah and Amel (2009), Costas *et al.* (2010) and Leimu and Koricheva (2005) report higher self-citation rates in multi-authored papers than single-authored papers.

Though we could not ascertain any correlation between number of authors and share of self-citations when we conducted *t*-test for self-citations in publications that are result of team work and of individual efforts; and for total citations in works of individual and team efforts, a significant difference was observed. From Table III, it is evident that articles which are produced in collaboration attract a higher number of self-citations (mean = 0.86) than the articles produced at individual level (mean = 0.39). Thus, irrespective of the number of co-authors in an article, co-authored articles attract a higher number of self-citations than those which are result of individual efforts. Though a relationship exists when number of self-citations are analyzed but no such association is observed when share of self-citations are tested against total citation count.

Collaboration type and self-citation

We studied three types of collaboration – institutional (all authors from the same institution), national (authors belonged to different institutions of the same country)

Table II.
Correlations between number of authors and total/ self-citations

	Total citation count	Number of self-citations	% age of self-citations
Number of authors			
Pearson Correlation	0.107*	0.082	0.021
Sig. (2-tailed)	0.048	0.121	0.700
n	342	342	342

Note: *Correlation is significant at the 0.05 level (two-tailed)

Table III.
Independent samples *t*-tests of citations (total and self) in works that are result of team and individual efforts

	n	Mean	SD	*t*-value	Sig. (2-tailed)
Total citations					
Collaboration	252	6.48	7.35	2.847	0.005
Solo	90	4.43	5.22		
Self-citations					
Collaboration	252	0.86	1.34	3.141	0.000
Solo	90	0.39	0.80		
Self-citations (*% age*)					
Collaboration	252	15.96	25.87	0.995	0.320
Solo	90	12.73	28.10		

and international (authors from different countries). In total, 43.65 percent collaborative works are a result of an institutional collaboration, 35.32 percent of national and 21.03 percent articles are of international collaboration.

To ascertain whether there is any statistical difference in citations (total and self-citations) to articles that were result of different types of collaboration, one-way analysis of variance (ANOVA) test was done. As evident from Table IV, there is no statistically significant variation in citations counts (total and self-citations) in works that are result of different types of collaboration.

Total citations and self-citations

In five-year citation window, 342 articles have received a total of 2,032 citations. Table V expresses that a majority of articles (111, 44.05 percent) have received citations in the range of one to three followed respectively by 24.60 percent papers that have received citations in the range of 4-6. On the other extreme there are only 23 papers (9.13 percent) which have received above 15 citations each. When it comes to self-citations, a maximum mean score of 2.33 self-citations are observed in articles which have received total citations in the range of 13-15 while articles with above 15 total citations following the list with 2.13 mean self-citations.

A number of studies have reported an inverse relationship between proportion of self-citations and total citation count (Aksnes, 2003; Hutson, 2006; Costas *et al.*, 2010;

	Sum of squares	df	Mean square	*F*	Sig.
Total citations					
Between groups	271.602	2	135.801	2.543	0.081
Within groups	13,299.299	249	53.411		
Total	13,570.901	251			
Self-citations					
Between groups	5.513	2	2.756	1.537	0.217
Within groups	446.626	249	1.794		
Total	452.139	251			
Self-citations (%)					
Between groups	2,360.578	2	1,180.289	1.774	0.172
Within groups	165,634.268	249	665.198		
Total	167,994.846	251			

Table IV. One-way ANOVA test of citations of self-citations in articles produced with different type of collaborations

Number of citations	Total number of papers	Number of self-citations[a]
1-3	111 (44.05%)	0.25 ± 0.48; 0 (0–2)
4-6	62 (24.6%)	1.02 ± 1.18; 1 (0–5)
7-9	28 (11.11%)	1.04 ± 1.29; 0 (0–4)
10-12	16 (6.35%)	1.25 ± 1.65; 1 (0–6)
13-15	12 (4.76%)	2.33 ± 2.67; 1 (0–9)
> 15	23 (9.13%)	2.13 ± 1.77; 2 (0–6)

Note: [a]Mean ± SD; Median (minimum–maximum)

Table V. Citation count in LIS papers

Leblond, 2012). To verify whether the same pattern exists in the field of Library and Information Science, a Pearson Correlation test was conducted. As evident from Table VI, a strong and statistically significant positive correlation exists between total citation count and frequency of self-citations ($r = 0.468$; $p < 0.01$; $n = 252$). However, no relation could be ascertained between total citation count and proportion of self-citations ($r = -0.121$; $p = 0.052$; $n = 252$). In other words, the number of self-citations may appear to increase with the increase in the total citation count but the growth of total citation count is not proportionately compensated with share of self-citations.

Currency of self and other citations

Studies have found that authors tend to cite more of their recent works than the work of other authors (Aksnes, 2003; Leimu and Koricheva, 2005; Costas *et al.*, 2010) and the share of self-citation decreases with growing time window (Davarpanah and Amel, 2009). It cannot be denied that there exists time-lag between when an article is published and non-authors become aware of it and can consider citing it. But there is no such time-lag for authors of publications. Unlike non-authors, authors need not to search for their own publication, go through their text (provided full-text is accessible) and finally cite it, if found relevant. As evident from Figure 1, the same trend is also observed here. On the time scale of first five years of publication of a work, the percentage of self-citations is found to be higher in the first two years as compared

Table VI.
Correlation between total citation count and quantity of self-citations

	Self-citations	Percentage of self-citations
Total citations		
Pearson Correlation	0.468**	−0.122
Sig. (2-tailed)	0.000	0.052
n	252	252

Note: **Correlation is significant at the 0.01 level (two-tailed)

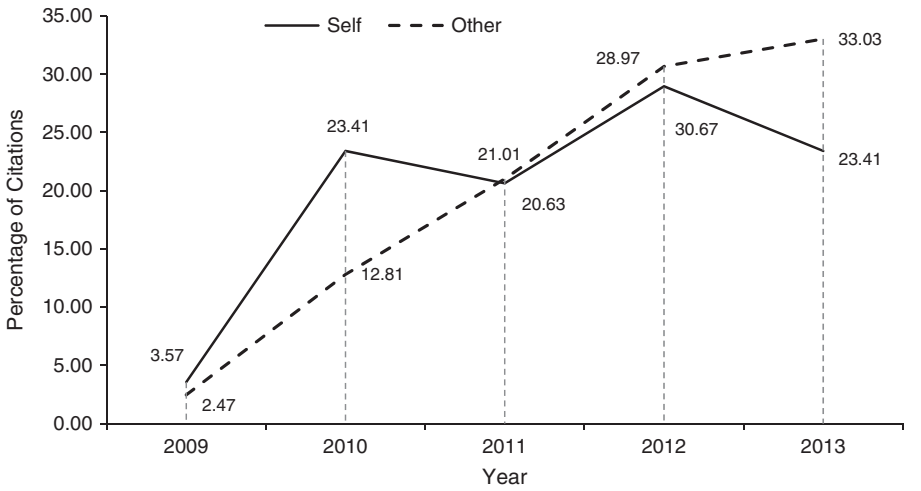

Figure 1.
Proportion of self and other citations in first five years of publication of work

to proportion of other citations. In the first two years, the cumulative sum of self-citations is 26.98 percent and in case of other citations it is only 15.28 percent. In other words, a work receives almost double the proportion of self-citations as compared to other citations. In the remaining three years a reverse trend is observed. The percentage of other citations is found to be more than the percentage of self-citations. In fact, the difference between other and self-citations goes on increasing with every passing year. Where the difference of only 0.38 percent is observed in third year, in fourth year it becomes 1.70 and 9.62 percent in the fifth year.

Publication source and citation count

To check whether the quality of publication source has any correlation with total citation count and on the number/share of self-citations, we used the Journal Impact Factor as a measure of quality of a source publication. Table VII expresses that both total citation count and number of self-citations are positively correlated with the impact factor of source publication and correlation coefficient for total citations is much higher than that for self-citations. A negative correlation exhibits between impact factor and the share of self-citations. Of particular note is that the correlation in all the cases is of weak nature.

Since impact factor of publication source solely relies on the citations that its articles receive, positive correlation between total citation count and impact factor is evident. Regarding negative correlation of the share of self-citations with impact factor, a number of studies were found in conformity with this regard. Gami *et al.* (2004) observe this phenomenon among the articles about diabetes mellitus in clinical journals. Kovacic and Misak (2004) attribute it to enhanced quality of articles, where there is high probability of attracting citations from other authors and thereby diluting the proportion of self-citations. Medoff (2006) observes the self-citation phenomenon in economics and reveals that self-citations that appear in prestigious high-impact economics journals have a statistically positive, but numerically small, effect on a subsequent article's total citation count and on the quality of the citing journal.

Conclusion

Citations to research and review articles that were published in 12 systematically selected, JCR-indexed LIS journals were thoroughly examined to observe the self-citation behavior of authors in the field of Library and Information Science. Within first five years of publication, 72.61 percent articles have received citations and around 39 percent cited articles do bear a minimum of one self-citation each.

The study proves statistically significant association between authorship strength and total citation count. Cooperation enriches the quality and amplifies the total citation count. However, no such cooperative influence is observed on the share of self-citations. Nevertheless, collaborative works irrespective of co-authorship strength

	Total citation count	Number of self-citations	Percentage of self-citations
Impact factor			
Pearson Correlation	0.258**	0.145**	−0.131*
Sig. (2-tailed)	0.000	0.007	0.011
n	342	342	342

Note: *,**Correlation is significant at the 0.05 and 0.01 levels, respectively (two-tailed)

Table VII. Reputation of publishing source

attract a larger number of self-citations than those which are result of individual efforts. But when it comes to share of self-citations, no such trend is observed. Also the influence of different types of collaboration (institutional, national or international) on citation count could not be ascertained.

The study affirms the authors' tendency of citing more of their recent works than the works of others. In the first two years after the publication of a work, the proportion of self-citations is higher compared to the share of other citations. Lastly, the study also confirms positive association of impact factor of source publication with total citation count and frequency of self-citations. However, a negative association is observed between impact factor and share of self-citations.

There is a need to have much through understanding of self-citation behavior in the field of Library Science and Information Science. Though we attempted to reflect the current trend, we encourage readers to further the study by taking into account a large sample, tracing citations also from Book Citation Index (WoS) and comparing results with other allied subjects so as to validate the robustness of the findings of this study.

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(The Appendix follows overleaf.)

Appendix

Table AI. Select journals for the study

S. no.	Journal title	ISSN	Impact factor	Number of articles	Number of cited articles
1	*Journal of Information Technology*	0268-3962	3.532	28	26
2	*Government Information Quarterly*	0740-624X	1.91	65	59
3	*European Journal of Information Systems*	0960-085X	1.558	39	39
4	*Journal of Management Information Systems*	0742-1222	1.262	38	33
5	*Knowledge Management Research & Practice*	1477-8238	1.069	30	28
6	*Journal of Academic Librarianship*	0099-1333	0.885	55	40
7	*Library Hi Tech*	0737-8831	0.621	45	29
8	*Profesional De La Informacion*	1386-6710	0.439	71	40
9	*Information Technology for Development*	0268-1102	0.378	19	17
10	*Journal of Librarianship and Information Science*	0961-0006	0.286	15	14
11	*Canadian Journal of Information & Library Science*	1195-096X	0.171	11	5
12	*Perspectivas Em Ciencia Da Informacao*	1981-5344	0.101	55	12
Total				471	342

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