

Correlation between Article Level Views, Google Citations and Scopus

Mangkollen Singson

Ranjit Kumar

Abstract

The paper is an attempt to highlight the importance of adopting various metric to evaluate scholarship. Article level views and citations metric (Scopus & Google Citation) of Annals of Library and Information Studies were extracted from 2011 to 2015 to establish the relationship between them using Pearson correlation. Findings of the study indicate that there was a positive correlation between the number of views and Google Scholar ($r = 0.22, p < 0.01$) (1% significant), however, no correlation between views and Scopus ($r=0.06, p < 0.01$). However, the study shows that positive correlation in cumulative article views and citation, the top 10 viewed articles and citations do not complement each other, articles that have receives maximum views do not necessary result to citation except for one article.

Keywords: Citation, Download, Article Views, Correlation, Alternative Metric, Annals of Library and Information Science

1. Introduction

For many years, librarians and information scientists have struggled with how to best determine the value of a journal, either in the context of a library collection or a field of study. Even today, the most accepted metrics such as “citation” is still been adopted as a criteria for evaluating individual performance, tenure and sometimes grants. Prior to this, citation measurement was developed by information scientists to give a broader, more research-based view of a journals impact on a field of study as citation data are tracked, compiled by Institute for Scientific Information (ISI) and sold by Thomson and Reuters. The best known product of ISI is the Web of Knowledge databases. However, ISI Web of Knowledge have also been critically viewed by few scholars (Bohannon, 2016; Adam, 2002; Cameron, 2005). Various studies have reported that

journal citation report is often exaggerated and distributions are skewed (Lariviere et al., 2016; Bohannon, 2016). Eugene Garfield the founder of ISI and the database himself stated that ‘in 1955, it did not occur to him that “Impact” would be so controversial’ (Garfield, 2005). Hence, the present study is an attempt to explore unconventional metric to determine the impact of an article such as downloads and view thereby establishing the relationship between these parameters.

2. Objectives

The following are the objectives that is guiding the study:

- ❖ To ascertain if top cited articles in Google Scholar Citation are also the most cited article in Scopus database.
- ❖ To examine if the top downloaded/viewed article are also the most cited.
- ❖ To determine the strength of relationship between download/views and citation.



3. Literature Review

An extensive literature search for publications on downloads versus citations turned out to be gaining momentum. The most frequently discussed topic along this line appears to be comparisons among various citation products or services. Charbonneau (2006) and Noruzi (2005) and Jasco (2005) compared Scopus database, Google Scholar and ISI citation indexes. Further, extensive study by Bauer and Bakalbasi (2005) also compared citation counts from WoS (Web of Science-the Web version of ISI citation indexes), Scopus, and Google Scholar for articles published in JASIS&T (Journal of the American Society for Information Science & Technology) in 1985 and 2000 respectively.

The most related study to the present research is an editorial of International Journal of Cardiology (IJC), in which Coats (2005) compared two sets of 10 IJC papers, 10 most cited and 10 top downloaded, taken from the same one-year time period in terms of their subject content and document type (e.g., review or research report). The study found no overlaps in these two sets of papers. On the other hand, Coats (2005) did not explore whether there exists any relationship between top downloaded papers and citations to them – a theme for the current study. By contrast, Bollen, Van de Sompel, Smith, and Luce (2005) made a comparison between download and citation data and concluded that download data should also be used for computing impact factor (IF) which traditionally is calculated with citation data alone.

Increasingly, scholars have realized that both citations and downloads need to be combined to better assess the impact of a journals (Kaplan & Nelson, 2002). The same notion is also

communicated by Darmoni, Roussel, Benichou, Faure, Thirion, and Pinhas (2000) who after comparing the IF for a medical collection with a reading factor consisting of the ratio of a particular journal's download frequency to the total downloads of all journals as recorded in the system and found that the reading factor seems a credible alternative to IF.

Relationship between downloads and citations for one single electronic journal is explored by Moed (2005) from a bibliometric perspective. A synchronous approach applied in the research revealed that downloads and citations show different patterns of obsolescence of the used materials while a diachronous approach showed that, as a cohort of documents grows older, its download distribution becomes more and more skewed, and more statistically similar to its citation distribution. In addition, Moed examined the effect of downloads and citations on each other statistically. As shown, none of the studies reviewed above aims to investigate if top downloaded documents are also highly cited and thus frequently used by fellow researchers when citation is treated as an indicator of usage.

Similarly, there has been numerous studies on usage metric and alternative metric which eventually resulted to confusion. Glänzel & Gorraiz, (2015) article on "Usage metrics versus altmetrics: confusing terminology?" in Scientometric distinction of the two terminology exist. According to them, issue concerning data "instability" that also results in note worthy difference between usage metrics and altmetrics. Downloads remain as stable as citations since they are linked to clearly defined document spaces, even if the "user" space might vary. As a consequence, metrics are replicable if all

sources and data of production are properly documented. By contrast, altmetrics indicators are variable as these depend on both changes in the source side and user activity. Nieder, Dalhaug, & Aandahl (2013) evaluated the correlation between citation and download figures, hypothesising that articles with fewer downloads also accumulate fewer citations. Typically, in their study, publishers provided download figures together with the article. They also extracted and analysed the 50 most viewed articles from 5 different open access oncology journals. For each of the 5 journals and also all journals combined, correlation between number of accesses and citations was limited ($r = 0.01-0.30$). Considerable variations were also observed when analyses were restricted to specific article types such as reviews only ($r = 0.21$) or case reports only ($r = 0.53$). Even if year of publication was taken into account, high correlation coefficients were the exception from the rule. In conclusion, downloads are not a universal surrogate for citation figures. Similarly, Appell, (2007) reported a weak correlation between the number of downloaded full papers (both PDF and HTML) and the number of citations ($r=0.29$). However, in a letter to the editor of *Clinica Chimica Acta*, Lippi & Favaloro, (2013) provided evidence of a strong relationship between the most downloaded articles in the field of laboratory medicine and citation. According to them, “negative correlation was found between articles ranking in the Top 25 Hottest Articles list and relative number of SciVerse citations ($r = -0.720$; $p < 0.001$).

In a correspondence letter to the editor, *Current Science*, Sharma (2007) endorse that download counts are an indication to progress in science. Xue-li, Hong-ling, & Mei-ying (2011) collected the numbers of citations and downloads from 2005 to

2009 of papers in five Chinese general ophthalmological journals: *Recent Advances in Ophthalmology*, *Chinese Ophthalmic Research*, *Ophthalmology in China*, *Journal of Clinical Ophthalmology* and *Chinese Journal of Practical Ophthalmology*, published in 2005 from the Chinese Academic Journals Full-text Database and the Chinese Citation Database in Chinese National Knowledge Infrastructure (CNKI) to determine the correlation between download and citation and the peak time of download frequency (DF). The citations from 2000 to 2009 of papers published in 2000 were collected to determine the peak time of citation frequency (CF) of medical papers. According to them there is a highly positive correlation between DF and CF ($r = 4.91$, $P = 0.000$).

Hence in order to accomplish this research objective, analyzing citations and views of the annals of *Library and Information Science* journal papers. The citation data, as described earlier, is obtained from Scopus and Google Scholar respectively.

4. Methodology

The present study is an exploratory research designed to correlate view/download with citation. Total article views of *Annals of Library and information Studies* were collected by visiting the journal sites <http://nopr.niscair.res.in/handle/123456789/66> and citation from Scopus database and Google Scholar citation. Data's was restricted from 2011 to 2015 (the year in which the journal was indexed). Though the journal did not provide usage statistics, request was made for download statistics to the Editor in Chief. However the Editor in Chief, Mr. Mahesh informed us that views of the article may be considered for download since download statistics is not maintained by the journal. Hence,

view of the article is considered as usage statistics. The duration for the collection of the data was from November 2015 to February 2016.

The data's obtained from the sources were entered Microsoft excel 2007 and SPSS 16 for analyzing the data. Thereafter, a cumulative table for five years was prepared by taking into considerations only the total number of reads and citation. To analyze the data between reads and citation, Pearson correlation was used to analyze the data.

5. Data Analysis and Interpretation

5.1. Year wise Authorship Pattern

Table 1: Year wise Authorship Pattern of Annals of Library and Information Science

Year	Number of authors	Percentage
2011	69	23.38%
2012	49	16.61%
2013	75	25.42%
2014	64	21.69%
2015	38	12.88%
Total	295	99.98%

Table 1 shows that authorship pattern from 2011-2015 (window period of Scopus indexing) varies. The number of authors in 2013 were the most with 75 authorship, followed by 2011 (69 authors), 2014 (64 authors), 2012 (49 authors), and 2015 (38 authors). The results indicates that collaboration is evident from the number of authorship pattern seen in the above table. Also it depicts that there is no consistency of the authorship pattern. Moreover, there is no evidence to conclude that there is a trend of an increase as such.

5.2. Year Wise number of Articles

Table 2: Year-Wise number of articles in Annals of Library and Information Science

Year	Number of Articles	Percentage
2011	36	21.05%
2012	27	15.78%
2013	37	21.05%
2014	35	20.46%
2015	38	21.63%
Total	173	99.97%

Table 2 shows that the most number of article was observed in 2015. However the least number of article in a given year was 2012 with just 27 articles.

The year wise number of article also shows that there is a slight increase in the number of articles and there is no consistency maintained for the number of article per year, per issue.

5.3. Distribution of Citation

Table 3: Comparison of Citation Distribution in Google Scholar and Scopus Database

Number of Citation	Number of articles	
	Scopus	Google Scholar
1	69	28
2	17	22
3	07	16
4	2	11
5	6	4
6	-	6
7	-	10
8	-	1
9	1	3
10>	-	6
Total	102	107

Table 3 shows that differences in the citation pattern among the two database. A total of received 107 Google Scholar citation and Scopus received 102 citation-difference of 5 citations. Since Google scholar has a larger coverage it is obvious that citation will be more as compared to Scopus database. 69 article by Scopus and 28 article in Google Scholar received just 1 citation, 17 article in Scopus and 22 in Google Scholar receive 2 citation, seven article in Scopus and 16 article in Google Scholar received 3 citations, two and eleven article

from Scopus and Google Scholar received 4 citation, 6 and 4 article respectively from Scopus and Google Scholar received 5 citations, 0 and 6 article from Scopus and Google scholar received 6 citation, 0 and 10 citation from Scopus and Google Scholar receive 7 citation, 0 and 1 from Scopus and Google scholar respectively receive 8 citations, 1 from Scopus and 3 from Google scholar receive 9 citation and only 6 article received 10 or more citation from Google scholar alone.

5.5 Scopus Highly Cited Authors

Articles	Year	No. of Author	Author	Scopus Citation Count
Plant genetics and breeding research: Scientometric profile of selected countries with special reference to India	2011	6	Garg, K.C.; Kumar, S.; Bhatia, V.K.; Ramasubramanian, V.; Kumar, Amrender; Kumari, Jyoti	9
Research publications of National Metallurgical Laboratory during the year 2001- 2010 - A study on citation patterns	2011	3	Sahu, A.K.; Goswami, N.G.; Choudhary, B.K.	5
Usefulness and applications of data mining in extracting information from different perspectives	2011	1	Pal, Jiban K	5
Comparative analysis of scientific output of BRIC countries	2011	2	Kumar, Naresh; Asheulova, Nadia	
The Matthew effect and a relation with concept symbols and defaults	2011	2	Dilruba; Rousseau, Ronald	5
Adoption of social media by online newspapers of Kashmir	2013	2	Gul, Sumeer; Islam, Shahina	5
Solar cell research in India: A scientometric profile	2013	2	Dutt, Bharvi; Nikam, Khaiser	5
Web link analysis of interrelationship between top ten African universities and world universities	2011	1	Adekannbi, Janet	4
Scientometric Portrait of Nobel Laureate Harald zurHausen	2011	3	Munnolli, S. S.; Pujar, S. M.; Kademani, B. S.	3

Articles	Year	No. of Author	Author	Scopus Citation Count
IT skills among LIS professionals of medical libraries in India and Iran: A comparative study	2011	2	Farahi, Mina Tavassoli; Gandhi, R.T.D. Ramesh	3
Women's health information needs and information sources: a study of a rural oil palm business community in South-Western Nigeria	2011	2	Nwagwu, Williams E; Ajama, Monday	3
Webometrics study of Universities in Bangladesh	2011	1	Islam, Md. Anwarul	3
The influence of denominational affiliations on the information seeking behavior of the Ulama in Borno State, Nigeria	2012	2	Saleh, Adam Gambo; Sadiq, Hauwa	3
Analysis of India's solar photovoltaics research output	2012	2	Sinha, Bikramjit; Joshi, Kirti	3
Dementia research in India: A scientometric analysis of research output during 2002-11	2012	3	Gupta, B.M.; Kaur, Har; Kshitig, Avinash	3

Table 4 shows that most cited authors and their articles in Scopus database. Plant genetics and breeding research: Scientometric profile of selected countries with special reference to India” by **Garg, K.C.**; Kumar, S.; Bhatia, V.K.; Ramasubramanian, V.; Kumar, Amrender; Kumari, Jyoti in the year 2011 was the highest cited article in Scopus database, followed by Research publications of National Metallurgical Laboratory during the year 2001- 2010 - A study on citation patterns authored by Sahu, A.K.; Goswami, N.G; Choudhary, B.K, Usefulness and applications of data mining in extracting information from different perspectives (2011) by Pal, Jiban K, Comparative analysis of scientific output of BRIC (2011) by Kumar, Naresh; Asheulova, Nadia, The Matthew effect and a relation with concept symbols and defaults (2011) by Dilruba; Rousseau, Ronald, Adoption of social media by online newspapers of Kashmir (2013) by Gul, Sumeer; Islam,

Shahina, Solar cell research in India: A scientometric profile (2013) by Dutt, Bharvi; Nikam, Khaiser received 5 citation each.

It is evident from the above table that the top cited article were also the oldest of the lot. Hence aging paper have higher tendency of being cited in the present scenario.



5.6 Google Scholar Top-Ten most Cited Article and Author

Table 5: Top-Ten Most Cited Articles in Google Scholar Citation

Sr. No.	Articles	Year	No. of Author	Author	Google Scholar Citation
1.	Dementia research in India: A scientometric analysis of research output during 2002-11	2012	3	Gupta, B.M.; Kaur, Har; Kshitig, Avinash	16
2.	Research output of CSIR-Central Electro Chemical Research Institute (CECRI):A study	2011	3	Jeysankar, R.; Babu, B. Ramesh; Rajendran, P.	14
3.	Usefulness and applications of data mining in extracting information from different perspectives	2011	1	Pal, Jiban K	13
4.	Comparative analysis of scientific output of BRIC countries	2011	2	Kumar, Naresh; Asheulova, Nadia	13
5.	Citations in Annals of Library and Information Studies during 1997 to 2010:A study	2011	1	Deshmukh, Prashant P.	13
6.	Research publications of National Metallurgical Laboratory during the year 2001- 2010 - A study on citation patterns	2011	3	Sahu, A.K.; Goswami, N.G.; Choudhary, B.K.	12
7.	Plant genetics and breeding research: Scientometric profile of selected countries with special reference to India	2011	6	Garg, K.C.; Kumar, S.; Bhatia, V.K.; Ramasubramanian, V.; Kumar, Amrender; Kumari, Jyoti	9
8.	Women’s health information needs and information sources: a study of a rural oil palm business community in South-Western Nigeria	2011	2	Nwagwu, Williams E; Ajama, Monday	9
9.	Internet use by the college students across disciplines: a study	2011	1	Loan, Fayaz Ahmad	9
10.	Impact of information and communication technology (ICT) on library staff training: A comparative study	2012	2	Talab, Seyed Mohammad Ghaemi; Tajafari, Masoumeh	8

Table 5 shows the top ten most cited articles in Annals of Library and Information Science. It was observed that the most cited article is Dementia research in India: A scientometric analysis of research output during 2002-11 (2012) by Gupta, B.M.; Kaur, Har; Kshitig, Avinash that receive a total of 16 citations, close followed by Research output of CSIR-Central Electro Chemical Research Institute (CECRI):A study by Jeyshankar, R.; Babu, B. Ramesh; Rajendran, P. with 14 citations, Usefulness and applications of data mining in extracting information from different perspectives(2011) by Pal, Jiban K, Comparative analysis of scientific output of BRIC countries (2011) by Kumar, Naresh and Asheulova, Nadia, Citations in Annals of Library and Information Studies during 1997 to 2010:A study (2011) by Deshmukh, Prashant P received 13 citation each, Research publications of National Metallurgical Laboratory during the year 2001- 2010 - A study on citation patterns (2011) by Sahu, A.K.; Goswami, N.G; Choudhary, B.K. received 12 citation, Plant genetics and breeding research: Scientometric

profile of selected countries with special reference to India (2011) by Garg, K.C.; Kumar, S.; Bhatia, V.K.; Ramasubramanian, V.; Kumar, Amrender; Kumari, Jyoti, Women's health information needs and information sources: a study of a rural oil palm business community in South-Western Nigeria (2011) by Nwagwu, Williams E; Ajama, Monday, Internet use by the college students across disciplines: a study by Loan, Fayaz Ahmad received 9 citations, finally, Impact of information and communication technology (ICT) on library staff training: A comparative study(2012) by Talab, Seyed Mohammad Ghaemi; Tajafari, Masoumeh received 8 citations.

Top cited paper in Google scholar citation and Scopus do not complement each other. The top papers in Scopus is not always reflected in Google Scholar citation. Moreover, Google Scholar citation like his counterpart Scopus, citation and age of the paper are correlated. Most of the top ten articles are dominated by 2011 and 2012 papers.

5.7. Top 10 most Viewed Articles

Table 6: Top Ten Most Viewed Article in Annals of Library and Information Science

Sr. No.	Articles	Year	No of Authors	Authors	Views
1.	Library and information science research trends in India	2011	1	Mittal, Rekha	4094
2.	Adoption and user perceptions of Koha library management system in India	2012	2	Kumar V, Vimal; Jasimudeen, S	2521
3.	Impact of information and communication technology (ICT) on library staff training: A comparative study	2012	2	Talab, Seyed Mohammad Ghaemi; Tajafari, Masoumeh	2463
4.	Setting up an open access digital repository: A case study	2012	3	Jayakanth, Francis; Minj, Filbert; Dastidar, Prabir G.	1805

Sr. No.	Articles	Year	No of Authors	Authors	Views
5.	Problems and prospects of Hindi language search and text processing	2012	1	Tripathi, Aditya	1774
6.	Citations in Annals of Library and Information Studies during 1997 to 2010:A study	2011	1	Deshmukh, Prashant P.	1530
7.	A study of citation accuracy in psychology theses submitted to the University of Mysore	2011	3	Harinarayana, N. S.; Chikkamanju; Vasantha, Raju N	1345
8.	Electronic resources usage by postgraduates at the University of Colombo: Identifying the critical success factors	2012	1	Millawithanachchi, U S	1329
9.	Information needs of managers in Indian financial institutions	2012	1	Parvez, Akhtar	1254
10.	Conference proceedings as a source of information in LIS research in India: A study based on citations	2011	1	Rajgoli, Iqbalahmad U	1186

Table 6 shows the top ten most viewed papers of 2011-15 in Annals of Library and Information Science journals. It was evident from the above table that article entitled Library and information science research trends in India (2011) by Mittal, Rekha demonstrated the most viewed article (published between 2011-2015) with a total view of 4094, followed by Adoption and user perceptions of Koha library management system in India (2012) (2521 views), Impact of information and communication technology (ICT) on library staff training: A comparative study (2012) (2463 views), Setting up an open access digital repository: A case study (2012) (1805 views), Problems and prospects of Hindi language search and text processing (2012) (1774 views), Citations in Annals of Library and Information Studies during 1997 to 2010: A study (2011) (1530 views), A study of citation accuracy in psychology theses submitted to the University of

Mysore (2011) (1345 views), Electronic resources usage by postgraduates at the University of Colombo: Identifying the critical success factors (2012) (1329 views), Information needs of managers in Indian financial institutions (2012) (1254 views), Conference proceedings as a source of information in LIS research in India: A study based on citations (2011) (1186 views)

The most viewed articles unlike Scopus citation and Google scholar citation are not dominated by 2011 articles, rather 2012 paper received the most viewed papers. Moreover, top cited journals are not the most viewed article. There is a tendency that reader are often attracted by the title of the article and as a result view them, however, these views are not importantly resulting to citation.

5.8. Correlation between Views and Citation

Table 7: Pearson Correlation between Article Views and Citations

Correlations				
		View	Scopus	Google Scholar
View	Pearson Correlation	1	0.06286	0.227516
	Sig. (2-tailed)		0.411297	0.002609
	N	173	173	173
Scopus	Pearson Correlation	0.06286	1	0.637537
	Sig. (2-tailed)	0.411297		4.05E-21
	N	173	173	173
Google	Pearson Correlation	0.227516	0.637537	1
	Sig. (2-tailed)	0.002609	4.05E-21	
	N	173	173	173

** Correlation is significant at the 0.01 level (2-tailed)

Table 4.8 show the Pearson correlation result of views, Google Citation and Scopus. The result of the study indicate that there was a positive correlation between the number of views and Google Scholar ($r = 0.22, p < 0.01$) (1% significant), however there was no correlation between Views and Scopus ($r = 0.06, p < 0.01$). Since the coverage of Google Scholar citation is more than Scopus, probability of significant correlation is observe. Similar studies on the correlation on five open access oncology journals also suggest that there is a correlation between views and citation, hence providing scope that open access journal and citation compliments (Nieder et al., 2013).

5.9. Conclusions

The present study reveals so interesting findings such as prevailing variation in the number of article and no consistency on the number of article per issue per year is not observed. Citation in Google

scholar and Scopus database show a contrasting results, where Scopus database recorded lower citation rate when compared to Google scholar. There exist positive correlation between the number of views and Google Scholar Citation ($r = 0.22, p < 0.01$) (1% significant), however there was no correlation between Views and Scopus ($r = 0.06, p < 0.01$). Since the coverage of Google Scholar citation is more than Scopus, probability of significant correlation is observe. Lastly, the top viewed article do not result to citation and may be termed as popular articles.

Though the use of citation as a metric to measure research impact is well established, digital revolution of web-based access to the research literature offers a new potential measure of impact—download counts. Counting downloads is useful for at least two reasons: (a) download counts provides an early-days' estimate of probable citation impact (b) download count also provides useful

information on popular reading which otherwise do not result into citation.

Lastly, it is likely that download impact is just the first of many new and powerful indicators of research impact and direction that will emerge from an Open Access corpus. Hence, citation and download counts are just the first two terms in what will be a rich and diverse multiple regression equation predicting and tracking research impact.

Acknowledgement

We would like to thank Mr. Mahesh, Editor-in-Chief, Annals of Library and Information Science for the prompt mail in answering the unanswered questions, without his feedbacks this paper would not have seen the light of the day.

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About Authors

Dr. Mangkollen Singson, Assistant Professor, Department of Library and Information Science, Pondicherry University.
Email: manglien@gmail.com

Mr. Ranjit Kumar, Student, Department of Library and Information Science, Pondicherry University.