Journal of Scientometric Res. 2020; 9(1):70-76
http://www.jscires.org

Research Article

An Empirical Examination of Citation in Life Science

CH Peidu

Department of Library and Information Science, University of Delhi, New Delhi, INDIA.

ABSTRACT
The paper is an exploratory research that examines on the general perception that certain research papers or genre of papers, such as open-access papers, co-authored papers, etc., tend to be cited more than others. It examined the citation of 3866 papers in the field of life science published by 67 faculty members from four departments of three universities available in SCOPUS database. Analyses have been categorized into four areas viz. access type and its citation; paper type and its citation; authorship type and its citation; collaboration type and its citation. The first finding is that paid-access articles (23.06 citation per paper (CPP)) do far better than open-access articles (13.62 CPP) in terms of citation received. Second, among the types of paper review papers (54.07 CPP) receive highest number of citations. Third, multi-authored papers receive more citation than single authored papers. Among the multi-authored papers three and four authorship are most common. It is observed that with the increase in the number of authors the number of citations also increases. Lastly, internationally collaborated papers receive more citation than domestic or national collaborated papers. Tandemly, it is also observed that 542 (14.02 per cent) papers have not received any citation. Some of these uncited papers are published more than three decades; some of them as recent as published in the year 2018.The findings here have implications on understanding the citation culture of different genres of research papers. It is not important research papers that receive more citation but there are other factors such as number of authors, type of paper, type of collaboration, etc., that determine citation.

Keywords: Citation pattern, Paper type and citation, Access and citation, Authorship and citation, Collaboration and citation.

Correspondence
CH. Peidu
Department of Library and Information Science, University of Delhi, New Delhi – 110007, INDIA.
Email: peiduriisao@gmail.com

Received: 28-09-2019
Revised: 18-01-2020
Accepted: 06-04-2020
DOI: 10.5530/jscires.9.1.8

INTRODUCTION

There are several theoretical studies on the citation, such as its meanings, and practical implications of citation, role and significance of citation.[1-4] Until certain point of time citation (and reference) was used primarily as an acknowledgement and information retrieval tool, of-course, which is still even now. It is conceivable that citation has become a great interest to both scientists and, historians and sociologists of science after the introduction of science citation index (SCI) by Eugene Garfield.[5] When this indexing or information retrieval tool was beginning to be used as tool to evaluate or measure the *quality* of a scientist, it received many appraisals – to the disavowal and dismay of many and simultaneously, acceptance and praise of many, which is still an open field of discourse till today. The advent of citation databases that help to track citation has spur all the more the importance and use of and abuse of citation. The founder of SCI (now acquired by Thomson Reuters and called as Clariviate Analytics) also studied the legitimacy of citation analysis as a tool for evaluation of scientist after it has widely discussed among the scientific community, he concludes that, "as the scientific enterprise becomes larger and more complex, and its role in society more critical, it will become more difficult, expensive and necessary to evaluate and identify the largest contributors. When properly used, citation analysis can introduce a useful measure of objectivity into the evaluation process at relatively low financial cost".[6] However, this will not be without a debate and recoil.[7]

Having stated that, it is assumed that certain kind or genre of papers tends to cite more than other papers. In this paper we take an empirical approach to examine citationbehaviour of research papers.

Similar Studies and Their Findings

There are several empirical studies on citation behaviour of research such as, the mode of access – open access or paid access; the different types of papers – books, book chapters, review papers, research papers, conference papers, etc.; the

authorship – single authorship or joint authorship; types of collaboration – international or domestic. And the findings have been varied according to region or country, discipline or subject. There is a general perception open access papers receive more citation than that of paid access because of the traffic or accessibility and visibility to the research fraternity in the public domain. Moris[8] made a comparison count between citations using the Web of Science and the OA status of articles determined by using the search tools OAIster, OpenDOAR, Google and Google Scholar in four disciplines namely Ecology, Applied mathematics, Sociology and Economic. The study found that open access has clear advantage over paid access articles. Similar findings have been replicated across different disciplines such as Computer Science, Physics, Biology, Psychology, Sociology, Health, Political Science, Economics, Education, Law, Business, Management;[9] Philosophy, Political Science, Electrical and Electronic Engineering and Mathematics;[10] Oncology;[11] Hybrid Marine Ecology.[12]

A study by Esyenbach[13] on citation received within different types of OA articles published as an immediate OA article on the journal site have higher impact than self-archived or otherwise openly accessible OA articles. The study also found strong evidence that, even in a journal that is widely available in research libraries, OA articles are more immediately recognized and cited by peers than non-OA articles published in the same journal.

With regard to citation received by multi-authored papers and single-authored paper, there is a general perception that multi-authored papers receive more citation; and this is found true by many empirical studies in different fields. Smart and Bayer[14] found that not did it received more citation than single authored papers but it also has higher rate of acceptance, which they attributed as quality due to collaboration.[15] They also found that this relationship persisted independent irrespective whether self-citation is considered or not. Well that is true in general sense, it was found in certain case of some subjects or disciplines single authored papers received more citation than collaborated papers.[16]

Among the different types of collaboration and impact on citations there are several studies and varied findings. The finding varies from region or country to country, from discipline to discipline and field to field. For instance, a study by Puuska, *et al*.[17] on Finland's publication found that the citation impact increased in natural science and engineering of internationally collaborated papers than domestic collaborated papers whereas, it was not so with humanities. Even within internationally collaborated papers, citation impact increases with distance between with collaborating countries.[18] In general, international collaboration papers tend to receive more citation than domestic collaborated papers.[19, 20]

In certain case, it was found that inter-organizational (inter-institutional) co-authorship is equally rewarding in terms of citation with international collaborated papers as opposed to intra-organizational (intra-departmental) publications.[21]

METHODOLOGY

The study is based upon publications of four life sciences departments of three universities viz. Department of Botany and Department of Zoology, University of Delhi; Department of Biosciences, Jamia Millia Islamia; and School of Life Sciences, Jawaharlal Nehru University, Delhi. The datasets were downloaded from SCOPUS database. A total of 4168 raw papers published by 67 faculty members four life science departments of three different universities were downloaded.

Further, the datasets were organised and duplicate titles are filtered out, and records of around 3866 papers were deemed fit for analyses. Some types of papers such as, editorial (38 papers), erratum (25 papers) are not included in some part of the analysis. Table 1 gives detailed information of the publications of the faculty members.

Gross paper count accounts for all the types of paper inclusive of duplicate titles. After the removal of duplicate titles, it is accounted as net paper. There are 302 duplicate titles. The total citations received are 90728 and 87274, respectively.

Citation pattern of the papers are studied from four different facets:

i. Access type and its citation: the type of access has been listed by the database. So, there was no further need to identify the type of access. Two types of access were identified open-access and paid-access.

ii. Paper type and its citation: similarly, the different types of paper have also been listed or identified by the database. The papers are categorised into 11 different types. This includes book, book chapter, conference paper, editorial, erratum, note, etc., apart from different variant of research papers.

iii. Authorship type and its citation: for the determining the authorship, the total authors have been counted. And accordingly, authorship has been identified as single authorship or multi-authorship. Multi-authorship has

Table 1: Dataset records.

Gross no. of paper	Gross no. of citation	Net paper	Net citation	Paper without citation
4168	90728	3866	87274	542 (14.02 %)

Table 2: Type of Access Vs Citation.

Types of paper	Open access				Paid access			
	Total	(%)	Citation	CPP	Total	(%)	Citation	CPP
Article	188	4.86	2673	14.22	3172	82.05	71227	22.45
Article in press	5	0.13	3	0.60	16	0.41	9	0.56
Book	0	0.00	0	0	5	0.13	52	10.40
Book chapter	0	0.00	0	0	78	2.02	148	1.90
Conf. paper	1	0.03	1	1.00	81	2.10	827	10.21
Editorial	0	0.00	0	0	38	0.98	18	0.47
Erratum	2	0.05	0	0.00	23	0.59	12	0.52
Letter	0	0.00	0	0	12	0.31	76	6.33
Note	0	0.00	0	0	18	0.47	101	5.61
Review	4	0.10	46	11.50	206	5.33	11308	54.89
Short survey	0	0.00	0	0	15	0.39	773	51.53
Unclassified	0	0.00	0	0	2	0.05	0	0.00
Total	200	5.17	2723	13.62	3666	94.83	84551	23.06

been further categorised as two-author paper, three-author paper, and so on.

iv. Collaboration type and its citation: different types of collaboration have been identified by examining the affiliations of the authors. It has been categorised into two namely, international and national collaboration. National or domestic collaboration consists of three type inter-institutional (two different institutes of the same country), inter-departmental (between two departments of the same institution), intra-departmental (within the same department of the same institution).

RESULTS AND FINDINGS

Type of Access and Citation

In this section whether type of access has any impact on citation rate is examined. There are two types of access to the database, viz open-access and paid-access. The different types of open-access or the routes of open-access is not the concern. The SCOPUS database classification of mode of access to the papers is adopted. It is assumed that open-access in this database also mean freely available to the public without having to subscribe or pay to use the paper or document, and SCOPUS only acts a mediator or platform for the authors to publish their research in the interest of the public to get free access.

The finding here does not support the common belief that papers in open-access receive more citation than those papers published in the counter-part paid-access because they are freely available. This is calculated on the basis of average citation or citation per paper (CPP). Open-access papers have received 13.12 citations per article, whereas, paid-access articles have 23.06 citations per article. In the open-access category a total of 200 papers were published making 5.17 percentage of the total publication. From the paid-access category 3666 articles were published making 94.83 percentage. Whereas, in terms of citation, open-access articles received 2723 citations i.e. 3.17 percentage of the total citations. On the other hand, paid-access articles received 84551 citations i.e. 94.83 percentage of the total citations. Our finding does not conform to common belief or findings that open-access articles tend to be cited more than counter-part paid-access articles.

Type of Paper and Citation

In this section we examine what type of paper received more citation. SCOPUS has classified papers into the following: article, article in press, book, book chapter, conference paper, editorial, erratum, letter, note, review and short survey. And the same classification is adopted for the study.

As shown in Table 3, article paper with 86.91 per cent (3360 papers) makes up most of the publication types. It is followed by review paper with 5.43 per cent (210 papers) and conference paper with 2.12 per cent (82 papers).

The overall CPP is 22.58. From citation perspective, review papers received maximum number of citation than any other types of paper. Of the 5.43 percent (210 review papers) of all the publications, it received a 13.01 per cent (11355) of the total citations. On an average or citation per paper, review papers received 53.82 which more than double of the overall citation per paper. It is followed by short surveys on an average of 51.53. The citation per paper of article is 21.99 which is slightly lower than that of the overall CPP. Conference papers and book, book chapter are not cited much in comparison. This finding in this aspect conforms to

Table 3: Types of paper Vs Citation.

Types of paper	Total paper (%)	Total citation (%)	CPP	Max. Cited	No. of uncited paper	%
Article	3360 (86.91)	73900 (84.68)	21.99	836	374	11.13
Article in press	21 (0.54)	12 (0.01)	0.57	4	17	80.95
Book	5 (0.13)	52 (0.06)	10.40	31	2	40
Book chapter	78 (2.02)	148 (0.17)	1.90	20	40	51.28
Conference paper	82 (2.12)	828 (0.95)	10.10	108	25	30.49
Editorial	38 (0.98)	18 (0.02)	0.47	4	27	71.05
Erratum	25 (0.65)	12 (0.01)	0.48	7	21	84
Letter	12 (0.31)	76 (0.09)	6.33	36	3	25
Note	18 (0.47)	101 (0.12)	5.61	18	5	27.78
Review	210 (5.43)	11354 (13.01)	54.07	1653	25	11.91
Short survey	15 (0.39)	773 (0.89)	51.53	219	1	6.67
Unclassified	2 (0.05)	0 (0.00)	0.00	0	2	100
Total	3866	87274	22.58		542	

common findings that review paper received more citation than other types of paper.

Considering the number of uncited papers, *Article* papers has the maximum number of uncited papers (374 papers i.e. 11.13 per cent of its paper). However, in term of percentage, *Erratum* has the maximum number of uncited papers; 84 per cent of the *Erratum* papers are not cited. *Short survey* has the least number of uncited papers (1 out of 15 papers i.e. 6.67 per cent of its paper). It is followed by *Article* and *Review* papers – 11.13 per cent and 11.91 per cent of its paper, respectively.

It is noteworthy to observe that even *Errata* also get cited. Under what circumstances or situations these papers get cited is not studied here. But it would be interesting subject of study to explore.

Type of Authorship and Citation

The authorship pattern of 3866 papers have been analysed. Single authorship constitutes only 1.22 per cent (47 papers only) of the total publication. Multi-author papers accounts 98.78 per cent of the total publication. The authorship distribution is given in Table 4. Further, the distribution of multi-authored papers is examined.

As given in Table 4, among the multi-authored papers it is found that three-author paper is the most common type of authorship. It accounts for 20.10 per cent of the papers (777 papers). It is followed by four-author papers of 19.06 percent (708 papers), two-author papers of 17.13 percent (636 papers). Single-author papers account for 2.46 per cent (95 papers) of the total publications. Up to fourteen-author the count of number of publications is in double-digit, from fifteen-author paper onwards the count of number of publications is in single-digit.

Similarly, even in terms of citation, three-author papers have the maximum number of citation count of 16314 citations (18.69 per cent). It is followed by four-author papers with 15226 citations (17.45 per cent); five-author papers with 12618 citations (14.46 per cent); two-author papers with 11734 citations (13.45 per cent). Single-author papers have 725 citations (0.83 per cent). However, on average count of citation or citation per paper, ninety-two-author paper, with 836 citation, has the maximum number of citations. It is followed by fifty-four-author paper (551 citations), twenty-six-author paper (196 citations) and seventy-four-author paper (67 citations). But statistically it is incorrect because each of them has only single paper.

Taking into account only those authorship papers which has more than 10 papers, the fourteen-author papers have the maximum number of CPP of 41.60. It is followed by thirteen-author papers 41.52 CPP, seven-author papers with 32.94 CPP. Three-author papers which has the maximum percentage or proportion of total number of papers and total number of citations have 21.55 CPP. Single-author papers has average citation of 10.82 per paper. Overall, it is observed that citation increases with increase in the number of authors.

Type of Collaboration and Citation

In this context of analysis collaboration is identified in simplest approach even by examining the given affiliations of the authors. Co-authorship is equated as collaboration. Only the type of collaboration is examined, the intricacies and level or degree or the nature of collaboration is not studied. Two primary types of collaboration namely international and national/domestic collaboration based on the location of the institution have been identified. When affiliation of the co-authors is from at least two different nations or countries

Table 4: Type of authorship Vs Citation.

Authorship	Total paper	%	Total citation	%	CPP
1	95	2.46	725	0.83	7.63
2	650	16.81	11734	13.45	18.05
3	777	20.10	16314	18.69	21.00
4	741	19.17	15226	17.45	20.55
5	526	13.61	12618	14.46	23.99
6	353	9.13	9166	10.50	25.97
7	247	6.39	8136	9.32	32.94
8	156	4.04	4037	4.63	25.88
9	105	2.72	2418	2.77	23.03
10	66	1.71	1042	1.19	15.79
11	42	1.09	1108	1.27	26.38
12	27	0.70	588	0.67	21.78
13	23	0.59	955	1.09	41.52
14	15	0.39	624	0.71	41.60
15	7	0.18	285	0.33	40.71
16	6	0.16	100	0.11	16.67
17	2	0.05	14	0.02	7.00
18	1	0.03	5	0.01	5.00
19	3	0.08	46	0.05	15.33
20	1	0.03	4	0.00	4.00
21	4	0.10	8	0.01	2.00
23	2	0.05	65	0.07	32.50
26	1	0.03	196	0.22	196.00
28	2	0.05	114	0.13	57.00
30	1	0.03	5	0.01	5.00
31	1	0.03	1	0.00	1.00
32	2	0.05	27	0.03	13.50
36	2	0.05	113	0.13	56.50
37	1	0.03	1	0.00	1.00
38	2	0.05	46	0.05	23.00
54	1	0.03	551	0.63	551.00
74	1	0.03	67	0.08	67.00
88	2	0.05	99	0.11	49.50
92	1	0.03	836	0.96	836.00
Total	3866		87274		

it is equated as international collaboration. If the co-authors are from the same country, it is considered as national or domestic collaboration. National collaboration is further categorised into inter-institutional, inter-departmental and intra-departmental. An inter-institutional collaboration is one in which at least one author is from different institution from the rest but all from within the same country. An inter-departmental collaboration is one when all the authors are from the same institution but from at least two different departments. On the other hand, an intra-departmental collaboration is one when all the all authors are from the same department of the institution. As observed in the section above concerning the type of authorship that single authorship is very meagre compared to joint authorship. In other words, almost all of the research publications in life science are produced by collaborative effort.

Table 5: Type of collaboration Vs Citation.

Collaboration type	Total paper	%	Total citation	%
International	1074	29.42	47046	55.54
Inter-institutional	1047	28.68	14026	16.56
Inter-departmental	226	6.19	3949	4.66
Intra-departmental	1255	34.38	19310	22.80
Unspecified	48	1.32	371	0.44
Total	3650	100	84702	100

In this analysis single-authorship papers, editorial papers and erratum papers are not included. In the category of *Unspecified* it includes those papers whose affiliation could be determined because of incomplete information. Most of the papers under this category only the affiliation of the first author or corresponding author is given, affiliation of other authors could not be determined.

Unspecified category constitutes 1.32 per cent (48 papers). The category of *unspecified* is not interpreted in the analyses below because the papers in this category can fall into any of the category of collaboration.

It is found that collaboration within the department i.e. intra-departmental is the most common type of collaboration constituting 34.38 per cent (1255 papers), followed by inter-national collaboration 29.42 percent (1074 papers) and inter-institutional collaboration 28.68 percent (1047 papers). The least of all of type of collaboration is inter-departmental collaboration 6.19 percent (226 papers).

In terms of citation productivity, 3650 papers have received 84702 citations i.e. 23.59 citations per paper. Categorically, international collaborated papers are more productive than counter-part national or domestic collaborated papers. The CPP of international collaborated paper is 55.54 which is almost double the CPP of the total publications 23.59. In contrast the CPP of domestic or national collaboration is below the average citation of the total publications. Among the national collaborated papers inter-departmental collaborated papers are most productive with 17.89 CPP. It is followed by intra-departmental collaborated papers 15.6 CPP.

In Table 6, the growth rate of the different types of collaboration during different periods are examined. In all the periods for all the types of collaboration there is positive but fluctuating growth with the exception of the period 2016 to 2018. This period consists of only three years, whereas the other periods consist of 5 years each, even 1973 to 1980.

Table 6: Growth rate type of collaboration.

Period	A	PGR	B	PGR	C	PGR	D	PGR	E	PGR	TP	Overall PGR
1973 – 1980	0	0	0	0	0	0	8	0.00	4	0.00	12	0.00
1981 - 1985	15	0.00	3	0	0	0	45	462.50	15	275.00	78	550.00
1986 - 1990	35	133.33	8	166.67	3	0	57	26.67	4	-73.33	107	37.18
1991 - 1995	62	77.14	9	12.50	10	233.33	74	29.82	1	-75.00	156	45.79
1996 - 2000	98	58.06	66	633.33	29	190.00	135	82.43	2	100.00	330	111.54
2001 - 2005	227	131.63	92	39.39	32	10.34	203	50.37	1	-50.00	555	68.18
2006 - 2010	239	5.29	241	161.96	37	15.63	232	14.29	8	700.00	757	36.40
2011 - 2015	268	12.13	431	78.84	85	129.73	310	33.62	7	-12.50	1101	45.44
2016 – 2018	130	-51.49	197	-54.29	30	-64.71	191	-38.39	6	-14.29	554	-49.68
Total	1074		1047		226		1255		48		3650	
CAGR	SV=2	5.4%	SV=1	9.27%	SV=3	0.9%	SV=1	6.63%	SV=1	0.0%		
	EV=14		EV=29		EV=4		EV=18		EV=1			
	n=37		n=38		n=32		n=45		n=46			

A=International; B=National-interinstitutional; C=National-interdepartmental; D=National-intradepartmental; E=Unspecified; PGR=Periodic growth rate; TP=Total no. of papers

To get an overall growth rate the compound annual growth rate (CAGR) for each category or type of collaboration is applied. The base years i.e. end value (EV) and starting value (SV) is subjective for each type of collaboration. The first year the-type-of-collaborated-paper is published is the SV of the concerned type. Similarly, the last year the-type-of-collaborated-paper is published is the EV. Thus, the total number of years (n) for each category may differ.

CAGR is given by $(EV/SV)^{1/n}-1$

Where: EV = end value i.e. total number of research papers in the year 2018

SV = starting value i.e. total no of research papers in the year

n = total number of years

Thus, it is observed that there is significant growth in three types of collaboration namely, national – interinstitutional (9.27%), national – intra-departmental (6.63%), and international (5.4%). The growth rate in inter-departmental is significantly very low (0.9%).

Further, the number of uncited papers of the different types of collaboration is examined.

The highest number of uncited papers is found in intra-departmental collaborated papers. 180 papers are not cited even a single time. It is followed by interinstitutional collaborated paper; 153 papers have not been cited a single time. In terms of percentage count international collaborated papers has the least number of uncited papers. Only 9.03 per cent of its papers (97 out of 1074 papers) is not cited. Whereas, inter-institutional collaborated highest per cent of uncited papers

Table 7: Uncited papers in different collaboration types.

Collaboration type	Total paper	%	No. of uncited paper	%
International	1074	29.42	97	9.03
Inter-institutional	1047	28.68	153	14.61
Inter-departmental	226	6.19	26	11.50
Intra-departmental	1255	34.38	180	14.34
Unspecified	48	1.32	12	25
Total	3650	100	468	

14.61 per cent of its papers (153 out of 1047 papers). Intra-departmental collaborated papers are not far behind; 14.34 per cent of its papers are uncited.

CONCLUSION

As citation is widely been used and accepted as an evaluation tool, this study may give an understanding to what genre or kind of papers receive more citation. This study findings conform to many of the other research findings highlighted above. However, this study observed that open-access articles receive lesser citation than paid-access articles. This could be because open-access articles are published within the paid-access journals unlike those journals which are fully open-access. Due to which it may be less visible to other researchers who search and access for papers published in fully open-access journal and databases. The reason why review papers are often highly cited is because of the content coverage in the article and the period coverage. This gives a bird's view to what research has been done and the trends, which makes very handy for researchers in meagreness of time.

Concerning the authorship type and collaboration, joint authorship papers far exceed that of single authorship papers even so in the terms of citation received. Number of citations increases with increase in the number of authors. There is growing trend of joint collaboration with foreign institution; and those internationally collaborated papers receive more citation than national or domestic collaborated.

Tandemly, there is also uncited papers. It is observed that there were 542 papers that were uncited so far. Some of the papers are published more than three decades ago whereas, some are as latest as published in the year 2018. *Letter, Article in press, Editorial and Erratum* papers have percentage of uncited papers. On the other hand,*Short survey, Review and Article* papers have the least number of uncited papers. International-collaborated paper has lesser percentage of uncited papers compared to domestic-collaborated papers. It was also interesting to note that *Erratum* papers were also cited

ACKNOWLEDGEMENT

The author would like to thank UGC for the financial support through SRF. The author is also grateful to Dr. K.P. Singh (DLIS, DU) for every motivation.

CONFLICT OF INTEREST

The author does not have any conflict of interest.

REFERENCES

1. Price, DeDerek S. The Citation Cycle. Information Scientist. 1979/80;4:621-33.
2. Cronin B. The Citation Process: The Role and Significance of Citations in Scientific Communication. Taylor Graham, London. 1984.
3. Cozzens SE. What Do Citations Count? The Rhetoric-First Model. Scientometrics. 1989;15(5-6):437-47.
4. Wouters P. The Citation Culture. Doctoral Thesis Submitted to University of Amsterdam. 1999.
5. Garfield E. Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas. Science. 1955;122(7):108-11.
6. Garfield E. Is Citation Analysis a Legitimate Evaluation Tool?. Scientometrics. 1979;1(4):359-75.
7. Adam D. The Counting House – News Feature. Nature. 2002;415.
8. Morris M. The Citation Advantage of Open Access Articles. Doctoral Thesis submitted to Loughborough University. 2008. https://dspace.lboro.ac.uk/2134/4089.
9. Hajjem C, Stevan H, Yves G. Ten-Year Cross-Disciplinary Comparison of the Growth of Open Access and How it Increases Research Citation Impact. Bulletin of the IEEE Computer Society Technical Committee on Data Engineering. 2005.
10. Antelman K. Do Open-Access Articles Have a Greater Research Impact?. College and Research Libraries. 2004;9:372-82.
11. Hua F, Sun H, Walsh T, Glenny AM, Worthington H. Open access to journal articles in oncology: Current situation and citation impact. Annals of Oncology. 2017;28(10):2612-7.
12. Clements JC. Open access articles receive more citations in hybrid marine ecology journals. FACETS. 2017;2(1):1-14. DOI: 10.1139/facets-2016-0032.
13. Eysenbach G. Citation Advantage of Open Access Articles. PLoS Biology. 2006;4(5):0692-8.
14. Smart JC, Bayer AE. Author Collaboration and Impact: A Note on Citation Rates of Single and Multiple Authored Articles. Scientometrics. 1986;10(5-6):297-305.
15. Bornmann L. Is collaboration among scientists related to the citation impact of papers because their quality increases with collaboration? An analysis based on data from F1000Prime and normalized citation scores. Jasist. 2016;68(4): 1036-47.
16. Sooryamoorthy R. Do types of collaboration change citation? Collaboration and citation patterns of South African science publications. Scientometrics. 2009;81(1):177-93.
17. Puuska HM, Reetta M, Yrjo L. International and domestic co-publishing and their citation impact in different disciplines. Scientometrics. 2014;98(2):823-39.
18. Nomaler O, Koen F, Gaston H. Do More Distant Collaborations have more Citation Impact?. Journal of Informetrics. 2013;7(4):966-71.
19. Inzelt A, András S, Mihály S. Incremental citation impact due to international co-authorship in Hungarian higher education institutions. Scientometrics. 2009;78(1):37-43.
20. Khor KA, Yu LG. Influence of international co-authorship on the research citation impact of young universities. Scientometrics. 2016;107(3):1095-110.
21. Aman V. How collaboration impacts citation flows within the German science system. Scientometrics. 2016;109(3):2195-216.