Does Co-authored Articles Receive More Citations?

B. Elango*

Abstract

The aim of this study is to examine the relationship between the authorship and the citation impact. To illustrate this, articles in the field of tribology covered in Science Citation Index Expanded are used as sample. Authorship pattern, number of authors per article, percentage of authorships in decades, comparison of CPP, and uncitedness have been studied in this article. The result shows that 345% increase in the number of authors per article has been observed from 1963 to 2014 and co-authored articles receive more citations than single authored articles. Since the tribology is a highly interdisciplinary field, the results of this study can be considered as a proxy.

Keywords: Bibliometrics, Authorship, Citation Impact

Introduction

Author collaboration is an agreement between two or more authors to carry out a certain research. Collaboration (co-authored work) has strong influence in science and there are different reasons for collaboration such as increased publication visibility, sharing costs and exchanging ideas (Padial, Nabout, Siqueira, Bini, & Diniz-Filho, 2010; Vermeulen, Parker, & Penders, 2013). Uncitedness is an important aspect of citation analysis and needs a separate investigation (Carg & Kumar, 2014). Nabout *et al.* (2015) investigated the temporal trend of number of authors in ecology journals and found that there was an increasing trend in the number of multi-authored papers. In general, research trend towards multi-authors (Fu, Zhang, Zhao, Tong, Chen, & Huang, 2012; Sun, Ni, & Ho, 2010; Behrens & Luksch, 2010). According to Sahu and Panda (2014), there is no influence of multi-authorship to publish in core journals. Zhang, Qian, and Ho (2009) found that collaborative articles tended to have higher CPP. Smart and Bayer (1986) found that multi-authored articles have usually higher citation frequencies than single-authored ones.

In this study, we intend to analyse whether co-authored article has any influence in receiving citations than single authored article. The result of this study would help to understand the citation pattern.

Data

Data was drawn from Science Citation Index – Expanded of WoS. The literature on tribology research published was selected as sample of this study. The search was carried out with the following keywords in the topic search: **tribolog** or *"tribosyst*"* or *"tribo-syst*"* or *"tribo-chem*"* or *"tribochem*"* or *"tribotechn*"* or *"tribo-physi*"* or *"tribophysi*"* (Elango, Rajendran, & Bornmann, 2015; Elango & Rajendran 2015). Only document type *articles* were considered for this study. Citations received up to May 2015 were taken and self-citations were not excluded from this study (Elango, Rajendran, & Bornmann, 2013). The retrieved data was exported to MS-Excel for further analysis.

Results and Discussion

A total of 18004 articles were published in tribology research between 1963 and 2014. Authorship pattern of these articles is presented in Table 1. Overall, 90% of the articles are collaborative in nature and only 10% by single authors. Almost 75% of articles were contributed with a range of authors between 2 and 5. There are two articles with highest range of authors (16 and 18). Nearly 2% of articles are contributed by more than eight authors.

* Library, IFET College of Engineering, Villupuram, Tamil Nadu, India. Email: elangokb@yahoo.com

Table 1: Authorship Pattern

# Authors	# Articles	%
Single	1705	9.47
Two	3178	17.65
Three	3965	22.02
Four	3607	20.03
Five	2619	14.55
Six	1494	8.30
Seven	761	4.23
Eight	336	1.87
Nine	187	1.04
> Nine	152	0.84
Total	18004	100

Average number of authors per article over the period is illustrated in Fig. 1 which shows that there is a significant increase in the number of authors per article: increase is calculated to 345% from 1963 to 2014. It is observed from Fig. 1 that the rate of the increase in number of authors per article was accelerated in the year 1990 (mean = 3) and then it reached the highest in the year 2014 (mean = 4.47). It is due to research is becoming more complex and it needs more expertise. In a collaborative research, authors may combine their skills and expertise. For example, an article has been published by a group of 5 authors very recently in Plos One (Popovych, Lysyansky, Rosenblum, Pikovsky, & Tass, 2017). Among the five authors, methodology, investigation and analysis have been contributed by two authors whereas conceptualisation and writing the original draft have contributed by all the authors.

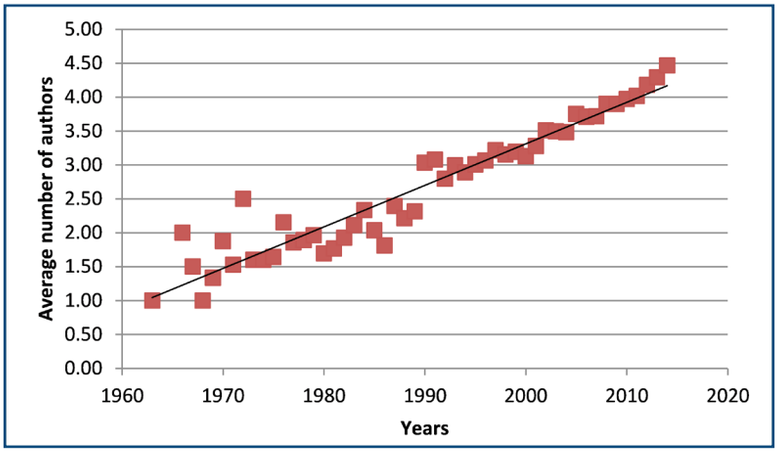

Fig. 1: Average Number of Authors per Article

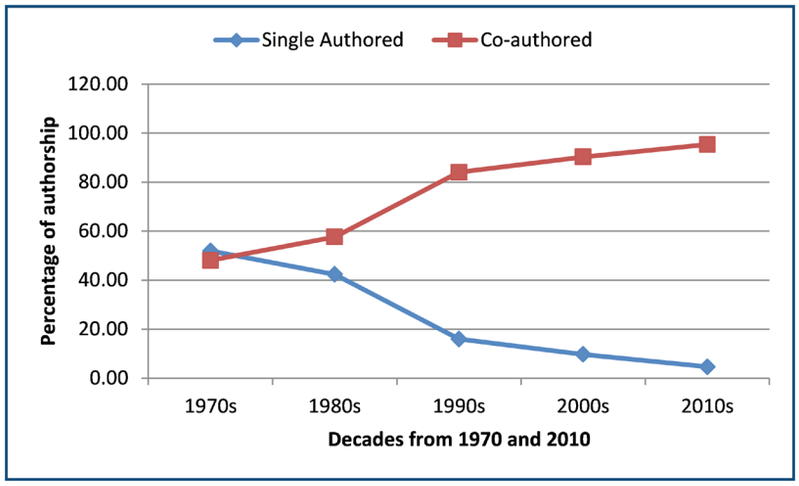

Fig. 2: Percentage of Authorship in Decades

Table 2 provides the information about the percentage of authorship in decades. The share of single authored articles is in decreasing trend (from 51.92% in 1970s to 5.61% in 2010s) while the share of co-authored articles is in increasing trend (from 48.08% in 1970s to 95.39% in 2010s). Fig. 2 shows that the share of co-authored articles was increased tremendously from 1980s to 1990s.

Table 2: Percentage of Authorship in Decades

Type	*1970s*	*1980s*	*1990s*	*2000s*	*2010s*
Single Authored Article	51.92	42.36	15.95	9.71	4.61
Co-authored Article	48.08	57.64	84.05	90.29	95.39

Table 3 presents the comparison of citation impact between single authored and co-authored articles in decades. Highest CPP is observed in 1990s irrespective of type of collaboration and lowest in 2010s which can be attributed that the recent articles having low circulation period than older ones. Ratio of CPP between single authored and co-authored articles is increased from +1.45 to +2.12 which shows that the co-authored articles receive more citations than single authored one. The highest ratio of CPP between single authored and co-authored articles is observed during 2000s.

Table 3: Comparison of CPP between Single and Co-authored

Type	*1970s*	*1980s*	*1990s*	*2000s*	*2010s*
Single Authored Article	4.37	8.02	12.58	6.39	1.92
Co-authored Article	6.36	12.84	21.63	16.23	4.08
Ratio	1 : 1.45	1 : 1.6	1 : 1.72	1 : 2.54	1 : 2.12

Relative Uncitedness Index (RUI) suggested by Carg and Kumar (2014) is used to compare the uncitedness between single authored and co-authored articles. RUI is the ratio of the share of un-cited articles (single vs. co-authored) to the share of total articles. The value of RUI can be zero or more. Higher RUI value indicates less impact and zero RUI value indicates there is no uncited article for the calculating unit. It is observed from table 4 that the share of un-cited articles of single authored is almost 150% higher than the share of co-authored articles. Similarly, the value of RUI is higher than 1 for single authored articles where as it is lower than 1 for co-authored articles.

Table 4: Un-citedness between Single and Co-authored Article

Type	*#Un-cited*	*% Un-cited Articles*	*TA*	*RUI*
Single Authored Article	835	48.97	1705	2.21
Co-authored Article	3152	19.34	16299	0.87
Total	3987	22.14	18004	
TA = Total Articles, RUI = Relative Uncitedness Index				

Conclusion

This study examined the relationship between the authorship and the citation impact with a sample of articles in the field of tribology covered in Science Citation Index Expanded. Authorship pattern, number of authors per article, percentage of authorships in decades, comparison of CPP, and uncitedness have been employed. The result shows that 345% increase in the number of authors per article has been observed from 1963 to 2014 and the rate of the increase in number of authors per article was accelerated in the year 1990 (mean = 3) and then it is reached the highest in the year 2014 (mean = 4.47). A strong decay has been observed in the number of single authored articles, from more than 50% in the 1970s to lower than 5% in the 2010s. The ratio of CPP between single authored and co-authored articles ranges between +1.45and +2.12. The share of un-cited articles of single authored is almost 150% higher than the share of co-authored articles. Similarly, the value of RUI is higher than 1 for single authored articles where as it is lower than 1 for co-authored articles. This result shows that the co-authored articles receive more citations than single authored articles and this result is in agreement with the results of Smart and Bayer (1986). Since the tribology is a highly interdisciplinary field, the results of this study can be considered as a proxy.

References

Behrens, H., & Luksch, P. (2010). Mathematics 1868-2008: A bibliometric analysis. *Scientometrics*, 86(1), 179-194.

Carg, K. C., & Kumar, S. (2014). Uncitedness of Indian scientific output. *Current Science*, 107(6), 965-970.

Elango, B., Rajendran, P., & Bornmann, L. (2013). Global nanotribology research output (1996-2010): A scientometric analysis. *Plos One*, 8(12), e81094.

Elango, B., Rajendran, P., & Bornmann, L. (2015). A scientometric analysis of international collaboration and growth of literature at the macro level. *Malaysian Journal of Library and Information Science*, 20(2), 41-50.

Elango, B., & Rajendran, P. (2015). Global tribology research output (1998-2012): A macro level scientometric study. *Journal of Information Science Theory and Practice*, 3(4), 35-48.

Fu, J.Y., Zhang, X., Zhao, Y. H., Tong, H. F., Chen, D. Z., & Huang, M H. (2012). Scientific production and citation impact: A bibliometric analysis in acupuncture over three decades. *Scientometrics*, 93(3), 1061-1079.

Nabout, J. C., Gomes, M. A. D. A., Machado, K. B., Rocha, B. D. S., Moura, M. E. P. D.... Logares, R. (2015). *The trends of multi-authorship and international collaborative in ecology papers.* In: Salah A. A, Tonta Y, Akdag Salah A. A., Sugimoto C, Al U (eds). Proceedings of the 15th International Society of Scientometrics and Informetrics Conference, pp. 610-611.

Padial, A. A., Nabout, J. C., Siqueira, T., Bini, L. M., & Diniz-Filho, J. A. F. (2010). Weak evidence for determinant so f citation frequency in ecological articles. *Scientometrics*, 85(1), 1-12.

Popovych, O. V., Lysyansky, B., Rosenblum, M., Pikovsky, A., & Tass, P. A. (2017). Pulsatile desynchronising delayed feedback for closed-loop deep brain stimulation. *Plos One*, 12(3), e0173363.

Sahu, S. R., & Panda, K. (2010). Does the multi-authorship trend influence the quality of an article? *Scientometrics*, 98(3), 2161-2168.

Smart, J. C., & Bayer, A. E. (1986). Author collaboration and impact: A note on citation rates of single and multiple authored articles. *Scientometrics*, 10(5), 297-305.

Sun, J., Ni, J., & Ho, Y. S. (2010). Scientometric analysis of coastal eutrophication research during the period of 1993 to 2008. *Environ Dev Sustain*, 13(2), 353-366.

Vermeulen, N., Parker, J. N., & Penders, B. (2013). Understanding life together: A brief history of collaboration in biology. *Endeavour*, 37(3), 162-171.

Zhang,W., Qian, W., & Ho, Y. S. (2009). A bibliometric analysis of research related to ocean circulation. *Scientometrics*, 80(2), 305-316.