

Does the Multi-authorship Trend Influence the Quality of an Article?

Satya Ranjan Sahu^{1*}, Krushna Chandra Panda^{2†}

1 CSIR-National Institute of Oceanography, Dona Paula, Goa, India – 403004

2 Department of Library & Information Science, Sambalpur University, Jyoti Vihar, Sambalpur, Odisha, India – 768019

† Present Address: Berhampur, Odisha, India

*Corresponding author:

Phone: +91 – (0) 832 – 2450 370

Fax: +91 – (0) 832 – 2450 601

Email: satya@nio.org

Abstract:

In the last few decades, multi-authored articles have increased in different disciplines with increasing instances of authorship abuse although multi-authorship is not always due to undeserving authorship (McDonald et al, 2010). It may be necessitated by interdisciplinary research, the evolution of a discipline, or the intention of quality improvement. This article studies the relationship between the authorship and the quality of articles (publications in better impact factor journals or core journals) in the field of Oceanography. The result shows ~ 75% increase in the number of authors per article from 1990 to 2009 in the discipline. The increase in authorship correlates not only with the percentage of articles in core journals but also with the mean IF of journals (where the articles were published). The ANOVA study shows that though multi-authorship has no influence on the preference to publish in core journals during the 1990s or 2000s, it does have a significant influence on the preference to publish in high impact factor (IF) journals in both the decades. So these findings establish that in the field of Oceanography, the increase in collaboration would have resulted in more publications in core journals (without any influence of authorship increase) and in better impact factor journals (due to the influence of authorship increase).

Keywords: *Authorship; Multiple Authorship; Co-authorship; Impact Factor; Core Journals; Journal Citation Report; Publish or Perish; Oceanography*

Introduction

Conceiving an idea and delivering it as a publication is not so simple in science. In the last few decades, multifaceted and complex scientific research is a trend demanding collaboration to deliver as publications. It is the materials and methods associated with such complex studies which discourage the individualist approach. Most collaboration has been necessitated by methodology (Teixeira da Silva, 2011). During this process the chance of ambiguous collaborators who directly or indirectly establish their involvement to share the credit increases (Birnholtz, 2006). Rarely do such collaborators involve themselves in the verbal plan, drafting the article or revising with intellectual inputs (Birnholtz, 2008). But the compulsion of primary investigators to publish their results frequently in peer-reviewed journals makes them insensitive towards the increase in number of authors in their articles (Reynolds & Wierzbicki, 2004; Baethge, 2008; Papatheodorou et al, 2008; Strange, 2008).

In the last few decades the increase in number of authors per article (Shaban & Aw, 2009; Baethge, 2008) with associated abuses, disputes and diminished accountability is a matter of concern for many editors (Yank & Rennie, 1999; Greenland & Fontanarosa, 2012). Although different journals have their author guidelines (Kressel & Dixon, 2011; Campbell, 1999; Yank & Rennie, 1999; Teixeira da Silva, 2011), such guidelines have limited effect (McDonald et al, 2010), probably because they are not enforceable. Meanwhile, the degree of discussion on ethical aspects and problems associated with increase in the number of authors per publication has overlooked the needs of the scientific process.

Availability and communication of generated literature are very important to researchers during a scientific process. In the world of science, there are a large number of journals published and it's growing. Researchers are baffled in selecting the right one to use as information source or to communicate their findings. On one hand, the number of articles published in core journals to non-core journals follows the exponential diminishing pattern in a specific subject (Bradford, 1985). And it is an important feature in selection of journals for reference. On the other hand, the journal impact factor (IF) is an element influencing researchers to publish in a given journal. In such a scenario, the increase in number of authors per publication and the choice of those authors to publish in IF journals and/or in core journals would be useful in showing the direction of progress of a discipline or science.

High IF journals help a discipline to prosper not only by its peer review process but also by disseminating quality publications (Calcagno et al, 2012). In this study, we analyze whether the increase in the number of authors per article in an interdisciplinary subject ‘Oceanography (also known as Marine Sciences)’ facilitates the publications in core journals or in high impact journals or both. This would help understand the scientific process where the manner and quality of knowledge generation is important.

Methodology

Oceanography is an interdisciplinary branch of Earth science. The reliable way of retrieving publication data from bibliographic databases in this subject is with very specific searches or refinement of search results. The data in this study were downloaded from WOS database (Web of Science Database - by Thomson Reuters) for twenty five countries (Fig.1). ‘Address specific’ searches were performed for representative Oceanographic institutes in those countries covering the period 1990-2009. These coastal countries lead in the field of Oceanography in their respective continents and have substantial publications in the field of ‘Oceanography’. For the countries where there is no major Marine Science institute or oceanographic programs in universities, the records were downloaded with the search refinement process. A data set was created with 46163 unique records for document type - ‘journal articles’ only. Impact factor was added to the records from the Journal Citation Reports (Thomson Reuters) and ‘0’ for the articles published in journals without IF.

To study the relationship between authorship and the quality of scientific articles (publications in better impact factor journals or core journals) in ‘Oceanography’, first the trend in number of authors per article was studied. Mean IF of articles published in journals were calculated for different authorship patterns (single to multiple authorships) at different time periods. In a recent publication (Sahu & Panda, 2012), the authors have shown a set of core journals which are inevitable in oceanography. So the percentage of contributions in this set of journals for different authorship pattern (single to multiple authorships) was also examined.

Results

Authorship Trends

Analysis of authorship in the field of oceanography during the 20 year period shows a significant increase in number of authors per article (Fig. 2). There is ~75% increase in the number of authors per article from 1990 ($\bar{X} = 2.65$) to 2009 ($\bar{X} = 4.65$). As is evident from Fig. 2, the rate of the

increase in authors per article during 2000s was accelerated than during 1990s. The number of authors increased approximately 27% more per article by the end of 1990s compared to the beginning of the decade ($X^- = 2.65$ to $X^- = 3.36$), whereas approximately 35% of increase in authors per article was visible at the end of the next decade in relation to its beginning ($X^- = 3.43$ to $X^- = 4.65$).

The increase in multi-authored articles at the end of 1990s is reciprocated by the significant decrease in single (~43%) and two authored (~26%) articles (Table-1). Whereas in the 2000s the increase in authorship is not only attributed to substantial decrease in single (~62%) and two authored (~43%) articles but also significant decrease in three authored (~15%) and four authored (~1%) articles. During the last two decades, approximately 90% of the articles in Oceanography are published where six or fewer authors are prevalent.

Authorship and Publication Pattern

Publication in Core Journals with Increase in Authorship

In the scientific world, the publications in peer reviewed core journals stand out as quality scholarly articles (White, 1981). To see if the increase in authorship influences the preference of authors to publish in core journals, one way ANOVA was conducted on the countries' percentage of articles in core journals. The result shows no influence of multi-authorship on the preference to publish in core journals, with $F(0.65) < F_{\text{crit}}(2.91)$ with $P > 0.01$ for the 1990s and $F(1.25) < F_{\text{crit}}(2.91)$ with $P > 0.01$ for the 2000s. But the combined publication pattern analysis of countries shows (Fig. 3) significant correlation ($r = 0.794$, $P=0.05$ for 1990s and $r = 0.903$, $P=0.01$ for 2000s) between the percentages of articles published in the set of core journals and the increase in authorship rate.

Increase in Authorship and Impact Factor

In recent years, the journal impact factor (IF) is synonymous with the quality of scholarly articles (Saha et al, 2003; Rieder et al, 2010). To understand if the increase in number of authors per article influences their preference to publish in better IF journals, one way ANOVA was conducted on countries' mean IF of the journals which publish these articles. The result shows that the increase in authorship has significant influence on preference to publish in high IF journals and as expected, F

(5.59) > F_{Crit} (2.91) with $P < 0.01$ for the 1990s and F (6.83) > F_{Crit} (2.91) with $P < 0.01$ for the 2000s.

A general analysis of publications from all the countries shows the increase in number of authors per article has significant correlation not only with the mean IF of all journals where the articles were published ($r = 0.958$, $P=0.01$ for 1990s and $r = 0.967$, $P=0.01$ for 2000s) but also with the mean IF of the core journals ($r = 0.830$, $P=0.05$ for 1990s and $r = 0.908$, $P=0.01$ for 2000s) and non-core journals ($r = 0.926$, $P=0.01$ for 1990s and $r = 0.987$, $P=0.01$ for 2000s) (Fig. 4).

Discussion

Oceanography is considerably young interdisciplinary subject. The rate of increase in the mean number of authors over the years as well as the decrease in single authored to four authored articles is characterizing the collaborative needs of subject. At the same time the pressures to “publish or perish” might be another reason for such trends (Sacco & Milana, 1984; Papatheodorou et al, 2008; Baethge, 2008; Reynolds & Wierzbicki, 2004; Shaban & Aw, 2009; McDonald et al, 2010). Six and fewer authors are prevalent in publications indicating the healthy research practice in the discipline. It is felt that the growth of more than six authored articles would have been coincidental or to improve the quality of the science.

The quality of the articles in core journals of a subject is relatively unquestionable (White, 1981). Our analysis shows that there is no influence of multi-authorship to publish in core journals. So the increase of publication in core journals in relation to increase in authorship suggests a non-causal correlation. It means the researchers give much importance to core journals to publish their finding irrespective of increase in authorship. On the other hand it is noticed that the increase in authorship of articles significantly influences researchers to publish in high IF journals. And the result of this influence is clearly reflected in the correlation between increase in authorship and impact factor of the journals (core or non-core). Two factors which can be attributed to such influence are: the broadening scope of the science with the increase in collaborators and evaluation of research or researchers with the IF yardstick. A comparison of results from both the decades shows that the influence of multi-authorship to communicate in high IF journals is more prominent during the 2000s than during the 1990s. The positive characteristics of this evolution seem to be the consolidation of subject field with the publication of articles in high IF core journals and the increase in visibility of articles with the publication in high IF non-core journals. A very important negative implication of this development is reported by Baum (2011) who states that many of the researchers even start their

investigation bearing in mind publication in a given journal rather than the value of the science itself. But in the field of Oceanography such activity is not reported in any literature and needs to be examined.

Conclusion

The trend of authorship increase is not always due to undeserving authorship (McDonald et al, 2010). A subject like Oceanography demands collaborative research and the decreasing trend of single to four authored articles is nothing but the depiction of increase in collaborations. The correlation of authorship increase with percentage of articles in core journals as well as with mean IF of journals (where the articles were published) establishes that in the field of Oceanography the increase in collaborations would result in quality publications with or without the influence of increase in number of authors.

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Table-1: Percentage of authorship at the starting and ending of the decade.

Authorship	1990	1999	2000	2009
Single	20.17	11.61	11.18	4.14
Two	35.9	27.22	25.12	14.51
Three	22.05	23.27	24.25	20.54
Four	12.14	16.43	17.98	17.68
Five	5.47	9.63	9.91	14.49
Six	2.22	5.64	5.88	11.11
Seven	0.85	2.75	2.28	7.07
Eight	0.51	1.49	1.17	4.32
Nine	0.34	0.77	0.92	2.07
>Nine	0.34	1.20	1.31	4.06

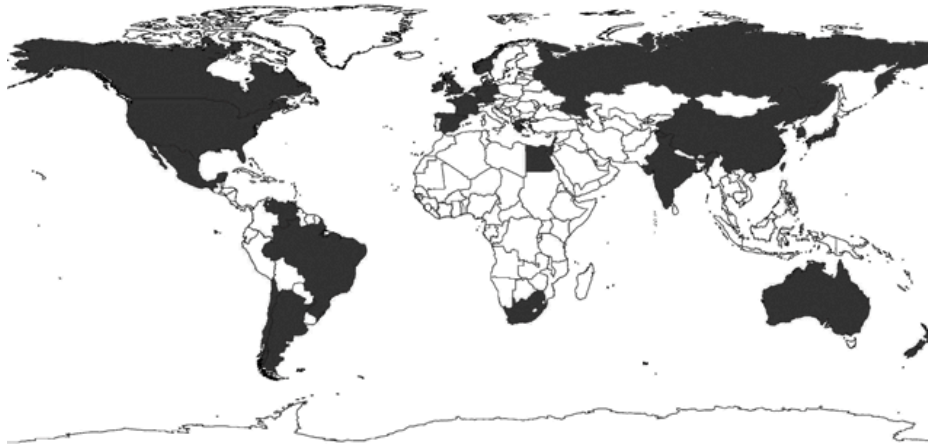


Fig. 1 Twenty five coastal countries from different continents which are studied

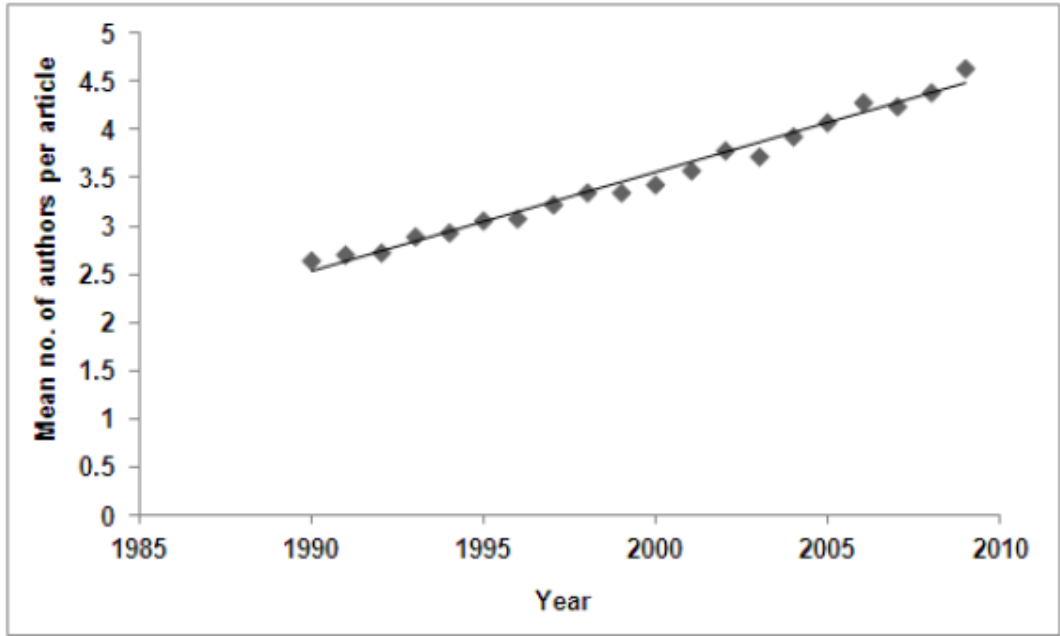


Fig. 2 The trend in the number of authors per article in Oceanography from the year 1990 to 2009

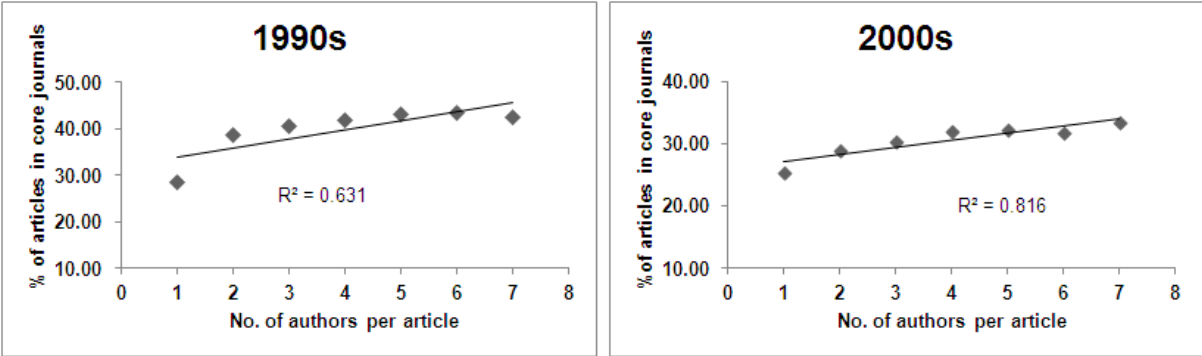


Fig. 3 Correlation between the percentages of articles published in the set of core journals and the increase in authorship rate

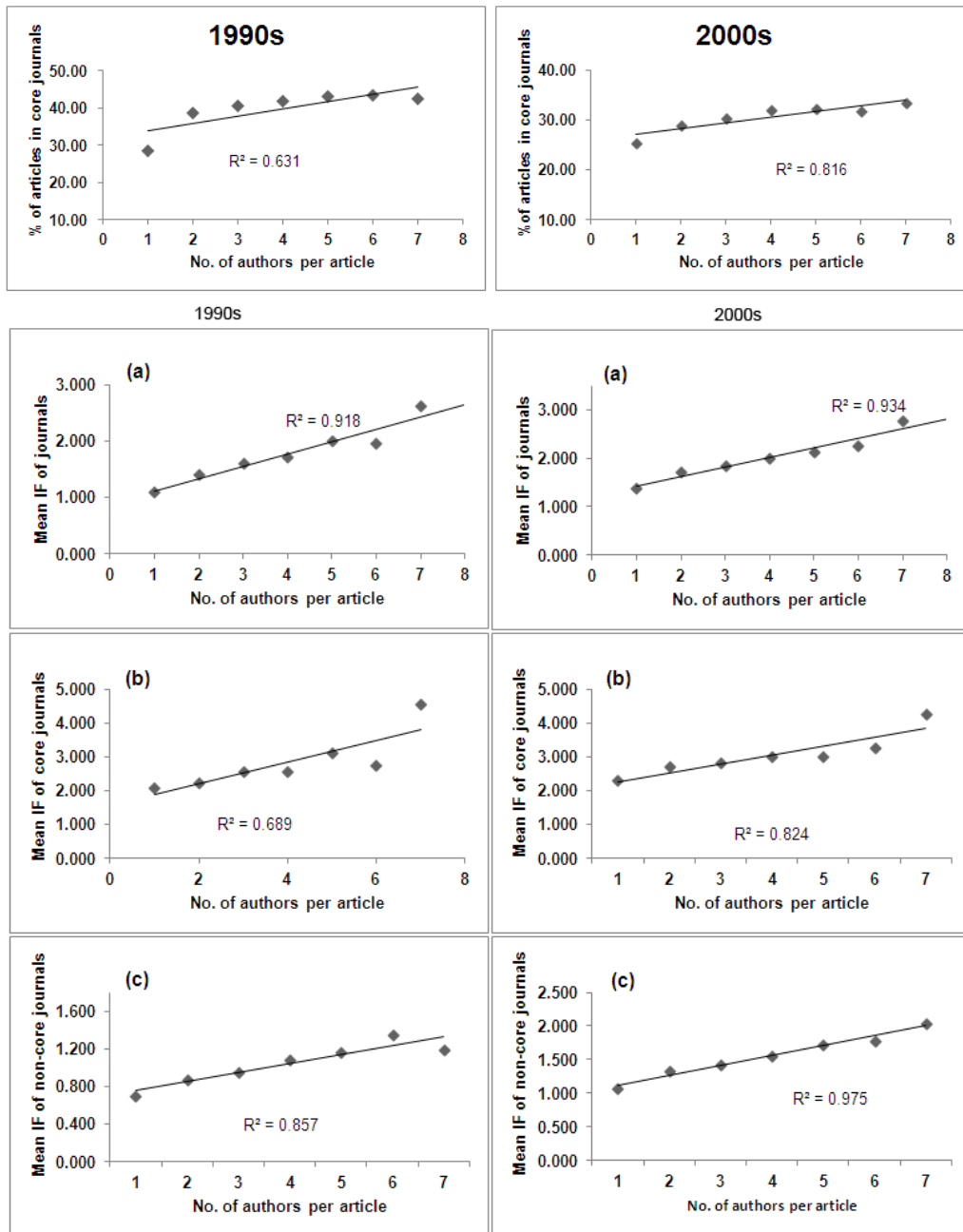


Fig.4 Correlation between the increase in number of authors per article and (a) the mean IF of all journals where the articles were published; (b) the mean IF of the core journals; (c) the mean IF of non-core journal