

## **Collaborative measures and Authorship patterns of Shrimp culture research publications– special focus to SCOPUS database**

**Tharmini A. and Navaneethakrishnan S**

[tharmine29@gmail.com](mailto:tharmine29@gmail.com), [knavan@univ.jfn.ac.lk](mailto:knavan@univ.jfn.ac.lk)

### **Abstract**

*The study examined the collaborative measures and authorship pattern of research publications in shrimp culture available in SCOPUS database during 2009 to 2019. The aim of this study is to identify collaborative measures like degree of collaboration, collaborative coefficient and collaborative index of these publications. A total of 3851 bibliographic records of publications were downloaded and analyzed in a bibliometric analytical method using R-studio software and MS excel. The analysis of bibliographic records of the total 3851 publications reveals that the entire publications were contributed by 18489 authors and among the type of publications, Journal articles occupied predominant position sharing 88.68% (n = 3415) percent of total study data. Contribution of Multi authors is high compared to single authored publications. Remarkable increase has been observed in the trend of authorship pattern and Degree of collaboration and Collaboration coefficient and Collaboration index in research publications of shrimp culture during the study period. Out of 3851 papers, 165 (4.28%) papers were contributed by single authors and rest of the publications were authored by multi authors. The Degree of collaboration has been increased from 0.924 in 2009 to 0.964 in 2019. Highest value of degree of collaboration - 0.979 was observed in 2017. The Collaborative coefficient has been increased from 0.67 in 2009 to 0.72 in 2019. Collaboration index of research publications increased from 4.12 in 2009 to 8.28 in 2019. The average collaboration index was 5.78 during the study span.*

**Keywords:** Authorship, collaborative measures, degree of collaboration, collaborative coefficient, collaborative index

### **Introduction**

The nations of the world are realizing the importance of aquaculture and implementing related research and development projects and the number of researchers related to them is also increasing. Due to insufficient production of shrimp culture, there is a need for the development of these research studies at global level. Authorship studies are a kind of bibliometric studies focused on authorship patterns. They describe authorship patterns of articles and authorship characteristics such as Degree of collaboration, Collaboration coefficient and Collaboration index of a specific group of authors. The starting point in an authorship study was to select a group of publications.

### **Objectives**

The principal objective of this study is to identify collaborative measures and authorship patterns of research publications in shrimp culture available in SCOPUS database. The specific objectives of the study are to identify the proportion of single vs. multi authored papers and to determine various significant aspects of collaborative measures like degree of collaboration, collaborative coefficient and collaborative index of these publications.

## Literature Review

Numerous Bibliometric studies were focused on Aquaculture Manikarachchi, (2018); Natale et al (2012). Some of them focused on publication output of a specific country Sylvain C. (1993). Some more focused on a particular database or Journals Jan, (2017); Kanakaraj (2016). Studies focused on authorship patterns were conducted to analyze the authorship characteristics of a group of authors. Navaneetha krishnan, Subramanian, (2014). The concept of collaborative measures and authorship pattern is an important factor in bibliometric analysis. Different formulas are used in authorship studies. The degree of collaboration is defined as the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time Subramanyan, (1983). Collaborative coefficient is a measure of collaboration in research that reflects both the mean number of authors per paper as well as the proportion of multi-authored papers Savanur, Srikanth, (2010). Collaborative index is used to compare the extent of collaboration in two fields (or subfields) or to show the trend towards multiple authorships in a discipline. The mean number of authors per paper, termed the Collaborative Index by Lawani (1980) as cited by Ajiferuke, Burell, & Tague, (1988).

## Methodology

The research method of this study was Bibliometric analytical method. In this study Bibliometric analytical software namely Bibliometrix - a R statistical package for analyzing and visualizing the bibliographic data from WoS and Scopus databases was used to identify authorship patterns and characteristics Aria, M., & Cuccurullo, C. (2017). The required data for the analysis of this study was collected from SCOPUS database, considering the availability and reliability of data. The process of selection of population of publications was as follows: Publication year - '2009-2019' Document type – “ALL” and the subject areas ‘Shrimp culture’, ‘Shrimp farming’. A total of 3851 bibliographic records of publications were downloaded. Collected data was exported in RIS format with complete bibliographic records for analysis. Degree of Collaboration, Collaboration coefficient and Collaboration index of these publications were identified using R-studio software and MS excel.

## Results & Conclusion

The analysis of bibliographic records of the total 3851 publications reveals that the entire publications were contributed by 18489 authors and among the type of publications, Journal articles occupied predominant position sharing 88.68% (n = 3415) percent of total study data.

Out of 3851 papers, 165 (4.28%) papers were contributed by single authors and rest of the publications were authored by multi authors. Majority of publications (18.85%) were contributed by four authors. The value of Degree of collaboration was 0.924 in 2009 and later it increased to 0.964 in the year 2019. Highest value of degree of collaboration - 0.979 was observed in 2017.

*Table 1 - Year Wise distribution of Degree of Collaboration*

<b>Year</b>	<b>Total publications</b>	<b>Single authored</b>	<b>Muli authored</b>	<b>Degree of Collaboration</b>
2009	291	22	269	0.924
2010	312	13	299	0.958
2011	324	13	311	0.960
2012	334	18	316	0.946
2013	327	20	307	0.939
2014	325	15	310	0.954
2015	316	10	306	0.968
2016	339	15	324	0.956
2017	381	8	373	0.979
2018	430	14	416	0.967
2019	472	17	455	0.964

The values of Collaboration coefficient have been increased from 0.67 in 2009 to 0.74 in 2019 during the study period. The overall average of collaboration coefficients was 0.72 and high collaboration observed in 2017 with 0.76.

Table 1 - Year Wise distribution of Collaboration Coefficient

Year	1	2	3	4	5	6	7	8	9	9<	Total	Collaboration Coefficient(CC)
2009	22	43	63	60	38	25	22	9	4	5	291	0.67
2010	13	40	54	78	36	48	21	8	7	7	312	0.71
2011	13	41	69	77	59	29	18	8	6	4	324	0.70
2012	18	54	50	59	49	42	27	15	10	10	334	0.70
2013	20	43	48	60	69	25	37	7	12	6	327	0.70
2014	15	47	50	60	46	40	32	11	14	10	325	0.71
2015	10	32	45	64	56	50	23	18	5	13	316	0.73
2016	15	29	53	57	58	56	26	18	8	19	339	0.73
2017	8	30	48	63	62	67	35	32	13	23	381	0.76
2018	14	36	60	76	69	56	50	26	19	24	430	0.75
2019	17	41	69	72	81	80	50	25	17	20	472	0.74
Total	165	436	609	726	623	508	341	177	115	140	3851	0.72
%	4.3	11.3	15.8	18.9	16.2	13.5	8.9	4.6	3.0	3.7		
Ave	15.0	39.6	55.4	66.0	56.6	47.1	31.0	16.1	10.5	12.8		

The values of the Collaboration index of research publications in shrimp culture have increased during the study period. In 2009 it was 4.12 which increased to 8.28 in 2019. The average collaborative index was 5.78 during the study period.

### Conclusion

Hence it has been concluded that contribution of Multi authors is high compared to single authored publications and there was a remarkable increase in the trend of authorship pattern and degree of collaboration and collaboration index in research publications of shrimp culture during the study span.

### Recommendations

Generally collaborative measures and authorship patterns of research articles or documents are most important to the researchers and scientists of the country. This study recommends more deep research on collaborative

measures and authorship patterns of research articles published at National level to increase the research productivity and visibility of Sri Lankan authors.

## References

- Ajiferuke, I., Burell, Q. & Tague, J. (1988). Collaborative coefficient: A single measure of the degree of collaboration in research. *Scientometrics* **14**, 421–433 <https://doi.org/10.1007/BF02017100>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix : An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. doi:10.1016/j.joi.2017.08.007
- Jan, A. (2017). ‘Aquaculture International 2013-2016: A Bibliometric Analysis’, *International Journal of Digital Library Services*, 7 (4), p79-87.
- Kanakaraj, S.( 2016). ‘Aquaculture Research Outputs from Scopus Database: A Bibliometric Analysis’, *Indian journal of information sources and services*, 6 (1), p20-29.
- Lawani, S. M. (1980). *Quality, Collaboration and Citations in Cancer Research: A Bibliometric Study*, Ph. D. Dissertation, Florida State University, 1980, xvii, 395p.
- Manikarachchi, M.I.U., (2018). A bibliometric analysis of research trends towards the objectives, opportunities and challenges for a Sustainable Blue Economy. In: *International Scientific Sessions*. Colombo: National Aquatic Resources Research and Development Agency (NARA). p. 72
- Natale et.al (2012) ‘Mapping the research on aquaculture. A bibliometric analysis of aquaculture literature’, *Scientometrics*, 90(3), p983-999.
- Navaneethakrishnan, Subramanian, "Authorship patterns and degree of collaboration of Sri Lankan scientific publications in Social sciences and Humanities – a picture from SCOPUS" (2014). *Library Philosophy and Practice (e-journal)*. 1153. <http://digitalcommons.unl.edu/libphilprac/1153>
- Savanur, K., Srikanth, R. (2010). Modified collaborative coefficient: a new measure for quantifying the degree of research collaboration. *Scientometrics* **84**, 365–371 (2010). <https://doi.org/10.1007/s11192-009-0100-4>
- Subramanian, K. (1983). Bibliometric studies of research collaboration: a review, *Journal of Information Science*, 6 (1): 33-38.
- Sylvain, C. (1993). ‘Canadian research activity in aquaculture: A bibliometric analysis’ *Scientometrics*, 27 (3), p295-316.