

## Contribution of Dr. S. Arumugam in Mathematical Society: A Scientometric Study



### Library Science

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<b>Mr. D. Chinnadurai</b>	Deputy Librarian, Kalasalingam University, Anand nagar, Krishnankoil- 626 126. Virudhunagar Dist.
<b>Dr. R. U. Ramasamy</b>	Librarian, SACS M.A.V.M.M Engineering College, Madurai - 625 301.
<b>Dr. B. Suresh</b>	Librarian, Madurai Kamaraj University, Madurai.
<b>Mr. S. Rajendran</b>	Librarian, SBM Engineering College, Dindigul.
<b>Mr. D. Balamurugan</b>	Librarian, Veerammal Engineering College, Singarakottai, Dindigul.

### ABSTRACT

*Scientometrics is an application of quantitative methods to the history of Science. It is also one of the techniques for documenting, collecting works of eminent scientists and researcher's. In this paper, we present a concise sketch of eminent Prof. S.Arumugam, stressing on his research achievements in mathematics. His research has had a great impact in the fields dealing with Graph Theory and its application, Domination in Graphs, Graph Labeling Problems, Graph Coloring, Fractional Graph Theory and Cryptography.*

### INTRODUCTION

Scientometrics are used to measure scientific activities, mainly by producing statistics on scientific publications indexed in databases. They are flexible tools used to study the sociological phenomena associated with scientific communicates, to conduct scientific/strategic, technical, technological or competitive monitoring, to design and manage research programs and to evaluate research. They are extremely valuable methods for evaluating research output, positioning studies and conducting foresight studies in science and technology.

Scientific publications seems to have provided the best available basis for measuring the outputs of individual scientist as there is good correlation between the eminence of scientists and their sustained research publications(Price 1986). From scientometrics analysis, it is possible to develop to a model on the performance of a role model scientist of a country who has direct bearing on the identification of promising scientists and human resource development in developing countries (Kadamen, Kalyane and Kumar 2001).

In the present paper, an attempt has been made to investigate the research work done by mathematician Dr.S.Arumugam and his role for the development of mathematical society.

### ABOUT DR.S.ARUMUGAM

Dr.S.Arumugam was born on the 7<sup>th</sup> July 1943 in Tirunelveli District of Tamil Nadu, India. He obtained his postgraduate and M.Phil degree in 1967 and 1968. He pursued his doctoral degree in 1978 at Madurai Kamaraj University, Madurai. He was started his career as Assistant Professor in St. John's College, Palayamkottai in 1968 and promoted as Professor and Heads of the department in 1971 to 1992. He was shifted to Manonmaniam Sundaranar University, Tirunelveli in 1992 as Professor and Heads of the department and served up to 2003. After his retirement, he was appointed as Senior Professor (Research) & Director (R&D), Arulmigu Kalasalingam College of Engineering (AKCE has been upgraded as Kalasalingam University) in 2003. Presently Dr.S.Arumugam is Director of n-CARDMATH (National Centre for Advanced Research in Discrete Mathematics), Kalasalingam University and it is sponsored by Department of Science and Technology, India.

He has to his credit over 150 research publications in various national and international journals, 19 text books also published and more than 31 research scholars have obtained their doctoral degrees under his guidance and supervision. He has serving as visiting faculty at various foreign universities i.e. Ball State University and Liverpool Hope University and member of various mathematical society like Indian Mathematical Society,

Ramanujan Mathematical Society, Calcutta Mathematical Society, American Mathematical Society, Mathematical Association of America, ISTE, ADMA and Institute of Combinatorics and its Applications. He is the founder Editor - in - Chief of AKCE International Journal of Graphs and Combinatorics.

### OBJECTIVES AND METHOD

Dr.S.Arumugam has been taken as a case study for the present Scientometric analysis. The study highlights:

- Year wise publications and productivity
- Types of publications
- Authorship pattern
- Authorship Collaboration
- Dissemination of the Channels of Communication

A total of 150 research articles by S.Arumugam published from 1984 to 2012 were obtained from his vitae and n-cardmath research centre and data was analysed as per the requirements of the study. The bibliographic fields were analysed by normal count procedure for domains, authorships and journal names similar with the method used in kademani etal (2002).

### RESULTS AND DISCUSSION

#### Publication and Productivity

Dr.S.Arumugam published 182 research articles and text books in the following fields, Graph Theory, Combinatorics, Discrete Mathematics, Engineering Mathematics, Cryptography and other area of mathematics. Table 1 reveals that, the number of articles published each year in chronological order. It is observed that during the periods of 2004 - 2012 he has published 105 publications with an average of 11.66 papers per year. His highest publication was in 2007 with an output 18 publications, followed by 16 in 2008, 13 in 2005, and 12 in 1999, 2009 and, 10 in 2010 and 2011.

The 182 publication records were further categorized based document types (Table 2) of which 116 papers are journal articles followed by 2 notes, 24 proceeding papers, 8 book chapters and 32 textbooks including two Tamil medium text books, which are widely used by the Under Graduate students of various Universities.. This indicates that Dr.S.Arumugam 's research attitude and his broad knowledge.

**Table 1**  
**Year-wise Distribution**

S.No	Year	No. of Contribution	Cumulative Total	Percentage
	1984	3	3	1.64

1985	1	4	0.55
1986	2	6	1.10
1988	1	7	0.55
1989	2	9	1.10
1990	2	11	1.10
1991	4	15	2.20
1992	4	19	2.20
1994	5	24	2.74
1995	6	30	3.30
1996	5	35	2.74
1997	4	39	2.20
1998	6	45	3.30
1999	12	57	6.60
2000	5	62	2.74
2001	4	66	2.20
2002	6	72	3.30
2003	5	77	2.74
2004	8	85	4.40
2005	13	98	7.14
2006	9	107	4.95
2007	18	125	9.90
2008	16	141	8.79
2009	12	153	6.60
2010	10	163	5.49
2011	10	173	5.49
2012	9	182	4.95

**Table 2**  
**Types of Publications**

Document Type	Records	Percentage
Journal Article	116	63.74
Notes	2	1.10
Proceeding paper	24	13.19
Books	32	17.58
Book chapters	8	4.39
Total	182	100.00

**Authorship Pattern of Dr.S.Arumugam**

Table 3 shows that, Dr.S.Arumugam has published 103 publications as primary author and 79 publications as multi-authored papers and textbooks during 1984-2012. The multi-authored papers and books includes: 49 publications as secondary author, 28 publications as third author and 2 publications as fourth author.

**Table 3**  
**Authorship Pattern of Dr.S.Arumugam**

Year	Primary Author	Secondary Author	Third Author	Fourth Author	Total
1984	1	0	2	0	3
1985	1	0	0	0	1
1986	2	0	0	0	2
1988	1	0	0	0	1
1989	1	1	0	0	2
1990	0	2	0	0	2
1991	1	2	1	0	4
1992	1	3	0	0	4
1994	3	1	1	0	5
1995	4	2	0	0	6
1996	4	1	0	0	5
1997	2	1	1	0	4
1998	5	1	0	0	6
1999	6	4	2	0	12
2000	3	2	0	0	5
2001	1	2	1	0	4
2002	2	3	1	0	6
2003	3	2	0	0	5
2004	3	5	0	0	8
2005	6	4	3	0	13
2006	2	3	3	1	9
2007	6	3	8	1	18
2008	11	2	3	0	16
2009	9	2	1	0	12
2010	7	2	1	0	10

2011	9	1	0	0	10
2012	9	0	0	0	9
Total	103	49	28	2	182

**Dissemination of the Channels of Communication**

Table 4 reveals that, dissemination of the channels i.e. his research articles and other records published these various national and international journals and publishers and the number of articles published in each journals. It is observed that, 20 papers published in proceedings followed by 12 papers each in Indian journal of Pure and allied Mathematics and Journal of Combinatory Mathematics Combinatory Computer, 8 papers in International journal of Management systems, 7 papers in Ars Combinatoria, 6 papers in three various journals, 4 papers in two various journals and national proceedings, 3 papers in two various journals, two papers in six different journals, 1 papers in 30 different journals and 32 books also were published in different topic like engineering mathematics, calculus, numerical methods, combinatorics etc...

**Table 4**  
**Dissemination of the Channels of Communication**

S. No	Name of the Journal	No. of Papers
	National and International Conference Proceedings	20
	Indian Journal of Pure Applied Math.	12
	Journal Combin. Math. Combin. Comput.	12
	Book chapters	8
	Intl. Journal of Management and Systems	8
	Ars Combinatoria	7
	AKCE J. Graphs Combinatorics	6
	Australasian Journal of Combinatorics	6
	Discrete Mathematics	6
	The mathematics students	5
	International Journal of Math. Combin.	4
	Journal of Discrete Mathematical Sciences and Cryptography	4
	National Workshop and Seminar Proceedings	4
	Journal of Indian math. Soc.	3
	Transmission Processing and Classification	3
	Bulletin of the Allahabad Mathematical Soc.	2
	Discussiones Mathematicae Graph Theory	2
	Indian journal of Mathematics	2
	Journal of Indones. Math. Soc.	2
	Journal of Ramanujan Math. Soc.	2
	Proc. Jangjeon Math Soc.	2
	Appl. Anal. Discrete Math.	1
	Bulletin of ICA	1
	Bulletin of Pure and Applied Sciences	1
	Bulletin of the Institute of Combinatorics and Applications	1
	Bulletin of the Kerala Mathematical Association	1
	Chemistry Education	1
	Computer Science and Informatics	1
	Discrete Mathematics, Algorithms and Applications	1
	Electronic Notes Discrete Math.	1
	Fractals	1
	Graph Theory Notes of New York	1
	Graphs and Combinators	1
	Graphs, Combinatorics, Algorithms and Applications	1
	Image and Vision Comput.,	1
	Indian journal of Information Science and Technology	1
	International J. Signal and Imaging Systems Engg.	1
	International Journal of Wavelets, Multiresolution and Information Processing	1
	JCS	1
	Journal of Combinatorics, Information and System Sciences	1
	Journal of Engineering and Applied Sciences	1
	Journal of mathematical and Physical Sciences	1
	MKU Technical Report	1

Opuscula Mathematica	1
Pattern Recognition	1
Publ. Mathematics Debrecen	1
Recent Trends in Mathematics	1
Taiwanese Journal of Mathematics	1
Tamkang Journal of Mathematics	1
Utilitas Math.,	1
Yungpook Math.	1
Text books	32

**Authorship Collaborations**

Dr.S. Arumugam has collaborated with 52 researchers during 1984-2012. The publication productivity of Dr.S.Arumugam's research group depicted in table 5. It has been observed that J.Paulraj Joseph had collaborated with Dr.S.Arumugam in the production of maximum number of papers i.e 9 publications followed by R.Kala, C.Pakkiam and I.Sahul Hamid with 7 papers, B.D.Acharya with 5 papers, L.Ganesan, K.A.Germina and five more researchers with 4 papers, 11 researchers with 3 papers, 10 researchers with 2 papers and 19 researchers with 1 paper.

**Table 5**  
**Authorship Collaboration**

S.No	Collaborators Name	No. of Contribution
	Paulraj Joseph. J	9
	Kala. R	7
	Pakkiam. C	7
	Sahul Hamid. I	7
	Acharya. B.D	5
	Genesan. L	4
	Germina. K.A	4
	Indra Rajasingh	4
	Sankara Gomathi. B	4
	Sivagnanam. C	4
	Suresh Suseela. J	4
	Suresh. R.M	4
	Anitha. A	3
	Jebarajan. T	3
	Jeyakumar. H	3
	Meena. S	3
	RajaChandrasekar. K	3
	Rajikumar. K	3
	Santha Kumaran. AP	3
	Sithara Jerry	3
	Subramanian. M	3
	Sundara kannan. M	3

Velammal. S	3
Jacob. K	2
Meneeswaran K	2
Rajesh. R.S	2
Roushini Leely Pushpam	2
Srinivasagan. K.G	2
Sudha. S	2
Suresh Kumar. J	2
Thuraisamy. A	2
Varughese Mathew	2
Xavier. C	2
Ajiitha. V	1
Benedict Michaelraj. L	1
Bloom. G.S	1
Favaron. O	1
Jay Bagga	1
Kamatchi. N	1
Karuppasamy. K	1
Latha Martin	1
Nalliah. M	1
Rajan. S	1
Ramachandran. P.N	1
Salibor Froncek	1
Subbulakshmi	1
Teresa W. Haynes	1
Vasanthi. B	1
Veerapandian	1
Venuvanalingam. P	1
Versha George	1
Vijayakumar .G.R	1

**CONCLUSION**

Scientometric tools could be used to measure and compare the scientific research activities at various levels of aggregation including institutions, sectors, provinces and countries. They could also be used to measure research collaborations to map scientific networks and to monitor the evolution of scientific fields. Dr.S.Arumugam has published lot of publications as primary author and his research articles and other records published these various national and international journals and publishers and the number of articles published in each journals. His contribution still continues in the field of Mathematical Society.

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