

## Scientometric Portrait of Prof. M. Santappa

B. Shanthi<sup>1</sup>, K. Thangarasu<sup>2</sup>, S. Thanuskodi<sup>3</sup>

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### Abstract

In this paper, 357 articles published by Prof. Dr. Santappa, a Polymer Chemist, were collected from various sources and analysed. Out of these 8 articles are single authored and the remaining 349 are multi-authored papers. He has published in 56 reputed journals. He is a role model Scientist to young researchers.

**Keywords:** Santappa; Scientometrics; Polymer Science; Leather Science; Physical Chemistry; CLRI.

## INTRODUCTION

Scientometrics is the field directly concerned with the exploration and evaluation of scientific research. Scientometric studies of an Individual scientist deal with the biographical study of the individual and it correlates with his/her scientific achievements. Mushi Santappa was born in Jonnagiri village, Andhra Pradesh on 2nd October 1923. He did his undergraduate in Chemistry at the University of Madras (UOM) in 1943. He obtained his master's

degree from Banaras Hindu University (BHU) in 1946. He was awarded a Ph.D. from the University of London on a Govt. of India Scholarship in 1949 and he obtained another Ph.D. from Manchester University in 1951. His thesis was based on the "Physical Chemistry of High Polymers."

He joined as a Reader in the Physical Chemistry Department of the UOM in 1952 and he became a professor in 1958 at the Madurai Extension Centre of UOM. He worked as the Head of the Physical Chemistry Department in 1963 and he served as a Senior Professor at the University of Madras from 1966 to 1971. Then, he was the Director of Central Leather Research Institute (CLRI) Chennai from 1972-78 and 1980-81. He was the Vice Chancellor of Sri Venkateswara University (SVU), Tirupati, during 1979-1980. He served as the Vice Chancellor of the University of Madras from 1981 to 1984. He has guided 57 Ph.D. research scholars. He has extremely contributed to environmental protection programmes. He co-established "Avanti Leather Limited", a public limited company in 1976.

He was an elected fellow of several academies such as the Indian Academy of Sciences, National

**Authors Affiliation:** <sup>1</sup>Senior Technical Officer, Digital Library Unit, Knowledge Resource Centre, CSIR-Central Leather Research Institute, Chennai 600020, India, <sup>2</sup>Dean, Faculty of Arts, Department of Library and Information Science, Alagappa University, Karaikudi 630003, Tamil Nadu, India.

**Coresponding Author:** S. Thanuskodi, Dean, faculty of Arts, Department of Library and Information Science, Alagappa University, Karaikudi 630003, Tamil Nadu, India.

**E-mail:** thanuskodi\_s@yahoo.com

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Academy of Sciences, Royal Institute of Chemistry, and New York Academy of Sciences, and a founder fellow of the Academy of Sciences. He was awarded the Shanti Swarup Bhatnagar award for his outstanding contributions to Chemical Science by the Council of Scientific and Industrial Research (CSIR) in 1967. In 1982 he was awarded the Sir J. C. Ghosh Memorial Medal of the Indian Chemical Society. In 1985 he was awarded the FICCI Award for Science, and Technology from the Federation of Indian Chambers of Commerce & Industry and he was awarded the Voice Award for Science and Technology of Leather from Sri Kanchi Mahaswamy Trust. He received an honorary DLitt from Gulbarga University and the Degree of Doctor of Science from four universities namely Andhra University, Madras University, Krishna Devaraya University, and Madurai Kamaraj University. An annual award named "Prof. M. Santappa Award" for research excellence in polymer chemistry was instituted by the Society of Polymer Science, India. He died on February 26th, 2017 at the age of 93.

### Review of Literature

William Shockley (1957) was the foremost writer to suggest scientific papers as a measure of research productivity. He was interested in measuring research productivity, among individual scientists/researchers within a group by analysing their publications.

Subramanian (1983) in his bibliometric studies of research collaboration has mentioned that the degree of collaboration is the ratio of the number of collaborative research papers to the total number of research papers published in the discipline during a certain period of time.

Kalyane and Kalyane (1993) in their paper on the Scientometric portrait of Dr. Vinodhini Reddy, a medical scientist analysed her research publications quantitatively from the year 1960 to 1993 by authorship pattern, keywords, collaborators, and collaborative coefficient.

Kadmani *et al.*, (1999) have measured the research productivity of Dorothy Crowfoot Hodgkin. She published her first paper at the age of 22 in the journal Nature. Her Collaborative coefficient was at its peak from 1952 to 1956 and it was 0.9. Her productive coefficient was 0.60 which shows that her publication productivity increased after her 50-percentile age. The study also reveals that she did not publish in four years: 1942, 1947, 1978 and 1985.

Kalaiappan *et al.*, (2010) carried out the analysis of 214 articles published between 1942 to 1990 by Prof. G.N. Ramachandran in the areas of Biophysics and Crystallography. On average, he contributed 4 to 5 papers in a year. His peak productivity was during 1962-1971.

Dixit, and Jange (2018) in their paper scientometric portrait of Prof. Gajanan R. Naik analysed the 114 papers published by him. They found the core collaborators Joshi G .V. who topped the list with 12 papers followed by Virupakshi S. with 10 papers and Gireesh Babu K. with 8 papers. They have estimated the total citations received as 383, the average citation per year as 22.59 and h-index as 8.

Suresh and Thanuskodi (2019) aimed to analyze the seed technology research output from 2008 to 2017. 8576 articles were downloaded and analyzed. The Degree of Collaboration was found as 92% which shows the collaborating authorship pattern was high in the seed technology discipline. The most productive journal was the International Journal of Food Science and Technology with 177 publications.

### Objectives

The main objectives of this study are to analyse the data pertaining to the publications of Prof. (Dr.) M.Santappa:

- To analyse the publication productivity in chronological order.
- To find the Average yearly contribution and Productivity coefficient.
- To examine the Authorship pattern and Degree of Collaboration.
- To explore the most preferred communication channels.

## METHODOLOGY

The data used for this study is secondary data and it was collected from the following databases: Scopus (118), Web of Science (243), Pubmed (4), Google Scholar (386), CrossRef (178), and in-house Leather Science journal (bound volume) (107). The search strategy used to retrieve the data was author name = "M. Santappa" or "Mushi Santappa". The bibliographical data such as the name of the authors, title, and source of documents, year and volume of publication, issue number, and article type were taken for analysis. The data collected was exported to Microsoft Excel, refined, and each record was elaborated for segregation and easy analysis. The data were analyzed using different

Excel formulas. According to the objectives of the study, the results were tabulated.

### Data Analysis

**Table 1:** Chronological Distribution of Publications

Year	Publications	Cumulative Publications	Productive Age	Actual Age
1951	1	1	1	28
1954	2	3	3	31
1955	2	5	4	32
1956	3	8	5	33
1957	3	11	6	34
1958	4	15	7	35
1961	3	18	10	38
1962	3	21	11	39
1964	2	23	13	41
1965	5	28	14	42
1966	6	34	15	43
1967	11	45	16	44
1968	19	64	17	45
1969	11	75	18	46
1970	12	87	19	47
1971	10	97	20	48
1972	9	106	21	49
1973	9	115	22	50
1974	27	142	23	51
1975	21	163	24	52
1976	24	187	25	53
1977	32	219	26	54
1978	29	248	27	55
1979	20	268	28	56
1980	12	280	29	57
1981	33	313	30	58
1982	32	345	31	59
1983	3	348	32	60
1984	1	349	33	61
1986	3	352	35	63
1987	1	353	36	64
1988	2	355	37	65
1989	2	357	38	66

From the data in Table 1, It is inferred that Prof. Santappa's has published 357 papers from the year 1951 to 1989. His first paper was published at 28 years of age in the year 1951. At the age of 58 i.e., in the year 1981 he has published a maximum of 33 papers. He had 38 years of publication productive life that is from the age of 28 to 66. From the year

### *Chronological Distribution of Publications*

The chronological distribution of the publications, chronological age, and productivity age details of Prof. Santappa are given in Table 1.

1974 to 1982 his scientific productivity was more.

During the productive age, the Average yearly

$$\text{Average Yearly Contribution } A_{yc} = \frac{\text{Total Contribution}}{\text{Total Productivity age}} = \frac{357}{38} = 9.39$$

contribution of Prof. Santappa has been calculated using the formula.

The Average yearly contribution of Prof. Santappa is 9.39, which means on average he contributed 9 to 10 papers in a year from 1951 to 1989. His productivity age began at the age of 28, in the year 1951. His last paper was published in 1989 at the age of 66.

The Productivity coefficient is calculated using the following formula.

$$\text{Productivity Coefficient } P_c = \frac{\text{Chronological age of last publication}}{\text{Chronological age of fifty percentile age}} = \frac{66}{47} = 1.4$$

The Chronological age of the last publication is 66. He has attained fifty percentile age at his productive age of 19 and chronological age of 47. The productive coefficient of Prof. Santappa is found as 1.4, which clearly indicates his consistent publication productivity behaviour through out his 38 years of scientific research.

**Table 2.:** Degree of Collaboration

Year	Number of Authors							Single Authored papers Ns	Multi-Authored papers Nm	Degree of Collaboration
	1	2	3	4	5	6	7			
1951	0	0	1	0	0	0	0	0	1	1
1954	2	0	0	0	0	0	0	2	0	0
1955	0	2	0	0	0	0	0	0	2	1
1956	0	3	0	0	0	0	0	0	3	1
1957	0	3	0	0	0	0	0	0	3	1
1958	0	4	0	0	0	0	0	0	4	1
1961	0	3	0	0	0	0	0	0	3	1
1962	0	3	0	0	0	0	0	0	3	1
1964	0	2	0	0	0	0	0	0	2	1
1965	0	5	0	0	0	0	0	0	5	1
1966	0	4	2	0	0	0	0	0	6	1
1967	0	11	0	0	0	0	0	0	11	1
1968	0	18	1	0	0	0	0	0	19	1
1969	0	8	2	1	0	0	0	0	11	1
1970	0	12	0	0	0	0	0	0	12	1
1971	0	8	1	1	0	0	0	0	10	1
1972	1	5	3	0	0	0	0	1	8	0.89
1973	0	5	2	2	0	0	0	0	9	1
1974	0	4	11	7	4	1	0	0	27	1
1975	0	4	5	8	3	1	0	0	21	1
1976	0	5	9	6	3	1	0	0	24	1
1977	0	2	15	8	6	1	0	0	32	1
1978	0	4	10	11	4	0	0	0	29	1
1979	0	0	8	11	0	1	0	0	20	1
1980	0	0	8	4	0	0	0	0	12	1
1981	1	3	3	14	5	5	2	1	32	0.97
1982	1	2	10	16	3	0	0	1	31	0.97
1983	0	0	0	2	1	0	0	0	3	1
1984	0	0	1	0	0	0	0	0	1	1
1986	0	0	1	2	0	0	0	0	3	1
1987	0	0	1	0	0	0	0	0	1	1
1988	2	0	0	0	0	0	0	2	0	0
1989	1	0	0	1	0	0	0	1	1	0.5
Total	8	120	94	94	29	10	2	8	349	

### Degree of Collaboration and Authorship Pattern

Prof. Santappa's single authored papers, multi-authored papers, and Degree of collaboration are presented in Table 2.

Among the 357 articles published 349 papers were multi-authored papers and 8 were single authored papers.

Degree of Collaboration was calculated using the formula.

$$D_c = \frac{N_m}{(N_s + N_m)}$$

**Table 3:** Authorship pattern

Authorship pattern	No. of Publications	Percentage %
Single Author	8	2.24
Double Author	120	33.61
3 Author	94	26.33
4 Author	94	26.33
5 Author	29	8.12
6 Author	10	2.80
7 Author	2	0.56

**Table 4:** Top Nine Channels of Communication preferred by Prof. Santappa

Journal	No. of papers	Cumulative No. of papers	FPY	LPY	TY
Leather Science	107	107	1983	1973	11
Indian Journal of Chemistry - Section A	34	141	1986	1964	23
Die Makromolekulare Chemie	19	160	1986	1955	32
Journal of Polymer Science - Part A-1: Polymer Chemistry	19	179	1987	1966	22
Proceedings of the Indian Academy of Sciences - Section A	19	198	1971	1965	7
Journal of Inorganic and Nuclear Chemistry	16	214	1977	1968	10
Journal of Scientific & Industrial Research	15	229	1988	1954	35
Current Science	9	238	1979	1964	16
Journal of Polymer Science - Polymer Chemistry Edition	7	245	1982	1974	9

### Channels of Communication Preferred by Prof. Santappa

Prof. M. Santappa's 357 publications were distributed in 56 journals. The top 9 channels of communication used by Prof. M. Santappa are provided in Table 4.

FPY- First Publication Year; LPY- Last Publication Year; TY = Total Years.

Maximum number of 107 papers by Prof. M. Santappa were published in the Leather Science journal, 34 papers were published in Indian

Total 357 100

In his productivity period of 38 years the Degree of Collaboration was 1 for 32 years, this implies the collaboration is high. The degree of collaboration was 0.97 in the years 1981 and 1982, Dc was 0.89 in the year 1972, Dc was 0.5 in the year 1989 and Dc was 0 in the years 1954 and 1988.

### Authorshi Pattern

The authorship pattern of Prof. Santappa is given in Table 3.

Prof. Santappa had published 8 (2.24%) articles individually, 120 (33.61%) articles with 1 collaborator, 94 (26.33%) articles with 2 and 3 collaborators, 29 (8.12%) articles with 5 collaborators, 10 (2.80%) articles with 6 collaborators, and 2 (0.56%) articles with seven collaborators. Thus, the collaborated research was found to be dominant with two authors followed by three and four authors. From the authorship pattern it is clear that collaborative research is dominant.

Journal of Chemistry - Section A, 19 papers were published in each of the following three journals Die Makromolekulare Chemie, Journal of Polymer Science - Part A-1: Polymer Chemistry, Journal of Polymer Science - Part A-1: Polymer Chemistry, 16 papers were published in Journal of Inorganic and Nuclear Chemistry, 15 papers were published in Journal of Scientific & Industrial Research, 9 papers were published in the journal Current Science and 7 papers were published in Journal of Polymer Science Polymer Chemistry Edition. Leather Science was the top-ranking journal with 107 papers.



## CONCLUSION

A meticulous researcher and renowned Polymer Chemist, Prof. Santappa was awarded the Shanti Swar up Bhatnagar Award, for his extensive contributions to Science. The Society for Polymer Science, India has instituted an annual award, "Professor M. Santappa Award", in his honor, which recognizes excellence in research in Polymer Chemistry. He has published 357 papers in 56 journals. Out of which he has published 107 papers in Leather Science journals. The average yearly contribution is 9 to 10 papers. The productivity coefficient is found as 1.4. His scientific contributions will remain outstanding and will encourage youngsters to concentrate more on collaborative scientific productivity. His death is a great loss to the scientific community.

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