

SCIENTOMETRIC PORTRAIT OF DR. AMARTYA KUMAR SEN, THE NOBEL LAUREATE & BHARAT RATNA

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Abstract *The present study attempts to present the various attributes of research publications of Dr. Amartya Kumar Sen, the great Indian Economist, Noble Laureate and Bharat Ratna. The study is based on the publication data indexed in Scopus database during 1969 to 2015. A total numbers of 111 articles have been retrieved from the source database for the said period. During this long 47 publication years, Dr. A. K. Sen has published a total numbers of 111 publications with an average of 2-3 papers per year. He is the single dominant author in all his publications and preferred single author publications rather than collaborative publications. Out of his 111 publications, he has published only 1 publication with University of Delhi, India affiliation, however 53 publications with Harvard University, United States and 20 publications with Trinity College, Cambridge, United Kingdom. His publications are widely popular among the researchers, which shows that about 21(18.9%) papers are more than 100 times cited by the researchers and 2 papers are more than 300 times cited. Despite his core area of research in Economics, he has published in other applied areas of economics such as econometrics, finance, business, management, accounting, decision sciences, pharmacology, toxicology etc. In this study an attempt has been made to showcase the profile and publications of Dr. Amartya Kumar Sen as a Role Model for future researchers and academicians.*

Keyword: *Scientometric, Amartys Kumar Sen, Bibliometric, Scopus, Authorship Pattern, Collaborative Research*

INTRODUCTION

Dr. Amartya Kumar Sen, who is well known as Amartya Sen was born in Shantiniketan in 1933 in a Bengal family. His parents were Ashutosh Sen and Amita Sen. From his childhood he had grown up in an educational environment, as his father was a professor in Chemistry. Also he had come across the rescue of great Indian like Rabindranath Tagore and etc. He was deeply affected by the death and hunger caused by the Bengal famine in 1943, which later inspired him to be a great economist in welfare economics. He studied Economics in many Indian Institutes and then became a professor at the Delhi School of Economics, Delhi University. He went on to teach in many international universities of repute like London School of Economics, Trinity College at Cambridge and Harvard University. No Indian before him has ever held this positions.

In 1998 Professor Amartya Sen became the first Asian to be honoured with the Nobel Prize for Economics. Similarly, in the year 1999, he was awarded with Bharat Ratna, the great Civilian Award of India.

His research works are always considered by the researchers as a milestone in the development of welfare economics,

economics beyond gender disparity, social welfare etc. Besides his several popular works, Prof Sen has remained in criticism for his controversial writings. Though he lives abroad, Professor Sen retains his Indian nationality which he values very much. Mention may be made that Dr. Sen has been awarded with over 90 honorary degrees and various prestigious awards by the top universities and institutions around the world.

OBJECTIVES OF THE STUDY

The main objectives behind this study are as follows;

- To explore the authorship pattern and research collaboration in Dr. Amartya Kumar Sen's research publications;
- To identify the core journals and their impact factor, which has contained Dr. Sen's publications;
- To know the most cited papers;
- To establish an idea on prominent research areas covered in Dr. Sen's publications; and
- To identify the affiliated institutions in Dr. Amartya Kumar Sen's publications.

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REVIEW OF RELATED STUDY

Kalyane (1994) revealed the research contributions of M.S. Swaminathan, a distinguished Agricultural scientist and researcher through a scientometric portrait. In the similar light, Kalyane (1995) sketched a Scientometric Portrait of P. M. Bhargava, a biological scientist and depicted the impact of his contributions nicely. Kademani et al (1996) vividly analyzed research contributions of Nobel laureate S Chandrasekhar, the distinguished scientist in the field of Astrophysics. The study revealed his research contributions, collaboration coefficient, productive coefficients, and such other parameters. Angadi, et al (2004) portrayed a scientometric portrait of Nobel laureate Leland H. Hartwell with regard to his outstanding research contributions to the field of Physiology and Medicine spanning over 41 years of his research publishing career. The study revealed his contributions spread over various domains of medical sciences. Kademani et al (2000) conducted a bibliometric study of Vikram Ambalal Sarabhai through analysis of citations of his published papers. The study analyzed the year wise break up of citations, self citations, distribution of citations, citing journals, citation impacts and other such attributes of his publications.

Kademani et al (2001) Scientometric Portrait of Nobel Laureate Ahmed Hassan Zewail, a distinguished scientist in the field of Chemistry with regard to his 246 papers and revealed various dimensions of his entire publications. In the similar vein, Kademani et al (2002) made a scientometric portrait of another Nobel Laureate Harold W. Kroto, a distinguished scientist and researcher in the field of Chemistry with regard to his 190 publications. The study revealed the journals which the author chose as the best

channel of publication, his productivity coefficients and other important measures. Kalaiappan, Kaliyaperumal and Rajasekar (2010) made a Scientometric study of research contributions of Prof. G.N. Ramachandran in the field of Biophysics and Crystallography. The paper analysed the authorship pattern, collaborative trends of his publications, productive coefficients and other key aspects of his research contributions. However, the present study aims to present yet another Nobel laureate which has not yet been explored.

METHODOLOGY

Scopus is the World's largest bibliographic and indexing database, which has been chosen as the source database to retrieve required data for the study. The data used in the study have covered from Amartya Sen's early date of publications to 31st December, 2015, indexed in Scopus database. The database was searched using Surname and First Name in the "author search" window with its author id (AU-ID ("Sen, Amartya" 7401592846)) and the hits were again verified with affiliation, subject area etc. The results were exported in a CVS spread sheet file. All publication documents like Article, Review, Letter Editorial, Note, Book Chapter, Conference Paper, Book etc. were analyzed using some statistical methods like average, mean; percentage etc. and the outcomes were tabulated for final presentation of the results.

DATA ANALYSIS

Year Wise Publications

Table 1. Year wise Publications of Dr. Amartya Sen

Year	Year wise publications	Cumulative productivity	Productivity age	Age of Dr. Amartya Sen
1969	1	1	1	36
1970	0	1	2	37
1971	0	1	3	38
1972	0	1	4	39
1973	1	2	5	40
1974	2	4	6	41
1975	2	6	7	42
1976	1	7	8	43
1977	1	8	9	44
1978	1	9	10	45
1979	0	9	11	46

Year	Year wise publications	Cumulative productivity	Productivity age	Age of Dr. Amartya Sen
1980	1	10	12	47
1981	2	12	13	48
1982	0	12	14	49
1983	3	15	15	50
1984	1	16	16	51
1985	2	18	17	52
1986	3	21	18	53
1987	1	22	19	54
1988	2	24	20	55
1989	1	25	21	56
1990	1	26	22	57
1991	1	27	23	58
1992	2	29	24	59
1993	2	31	25	60
1994	0	31	26	61
1995	3	34	27	62
1996	1	35	28	63
1997	5	40	29	64
1998	4	44	30	65
1999	4	48	31	66
2000	2	50	32	67
2001	2	52	33	68
2002	6	58	34	69
2003	3	61	35	70
2004	5	66	36	71
2005	5	71	37	72
2006	0	71	38	73
2007	3	74	39	74
2008	5	79	40	75
2009	3	82	41	76
2010	2	84	42	77
2011	9	93	43	78
2012	7	100	44	79
2013	7	107	45	80
2014	2	109	46	81
2015	2	111	47	82

Table1 depicts the year wise publications of Dr. Amartya Sen. During the period 1969 to 2015, a long 46 publication years he has published a total numbers of 111 articles with an average 2-3 papers per year. His 1st publication has been

identified in the year 1969, when he was a man of 36 years old. It is observed in the table that, except some years like 1970-1972, 1979, 1982, 1994 and 2006, he has constantly published his research publications. Dr. Sen was awarded

with Nobel Prize in Economics in the year 1998, when he was a man of 65 years old with 44 research publications and Bharat Ratna, the great Civilian Award of Government of India in the year 1999, at the age of 66 with 48 research

publications. During these years Dr. Sen has published highest 9 papers in the year 2011 followed by 7 papers in the year 2012 & 2013 and 6 papers in the year 2002.

Collaboration of Publications

Table 2. Research Collaboration of Dr. Amartya Sen

Name of Collaborative Authors	Authorship Pattern						Total Publications	One author publications (Sn)	Multi author publications (Mn)	Collaboration Coefficient Mn/(Sn+Mn)
	One	Two	Three	Four	Five	> Five				
Sen, A.	100	6	4	1	0	0	111	100	11	0.09
Arrow, K.			2				2			
Suzumura, K.			2				2			
Anand, S.		1					1			
Dasgupta, P.			1				1			
Dreze, J.		1					1			
Kynch, J.		1					1			
Luken, L.			1				1			
Nussbaum, M.				1			1			
Osmani, S.		1					1			
Parodi, M.		1					1			
Pattanaik, P.K.		1					1			
Putnam, H.				1			1			
Seidel, R.			1				1			
Starrett, D.			1				1			
Walsh, V.				1			1			

Dr. Amartya Sen has not preferred for collaborative works during these 46 years of long journey of research and publications. The intensity of collaboration is fragile because the collaboration co-efficient is found to be only 0.09. It is seen that out of his 111 publications traced during these period, highest 100 papers are published by single author contribution and only 11 papers are published in collaboration with other authors. Dr. Sen has published

6 papers with two authors collaboration, 4 papers with three authors collaboration and 1 paper with four authors collaboration. And interestingly two foreign authors, Arrow, K. (Emeritus Professor, Stanford University, United States) and Suzumura, K. (Waseda University, Tokyo, Japan) are the prominent authors who have maximum 2 papers collaboration with Dr. Amartya Sen.

Most Cited Papers

Table 3. More than 100 Times Cited Papers of Dr. Amartya Sen

Title of the Article	Year of Publication	Journal Name	No. of Citations	Ranking
Elements of a theory of human rights	2004	Philosophy and Public Affairs	336	1
Poor, relatively speaking	1983	Oxford Economic Papers	325	2
Democracy as a universal value	1999	Journal of Democracy	294	3
Maximization and the act of choice	1997	Econometrica	246	4

Title of the Article	Year of Publication	Journal Name	No. of Citations	Ranking
Health: Perception versus observation. Self reported morbidity has severe limitations and can be extremely misleading	2002	British Medical Journal	242	5
Notes on the measurement of inequality	1973	Journal of Economic Theory	213	6
Development: which way now?	1983	Economic Journal	192	7
The possibility of social choice	1999	American Economic Review	181	8
Mortality as an indicator of economic success and failure	1998	Economic Journal	179	9
Missing women	1992	British Medical Journal	174	10
Human development and economic sustainability	2000	World Development	167	11
Why health equity?	2002	Health Economics	166	12
Dialogue capabilities, lists, and public reason: Continuing the conversation	2004	Feminist Economics	143	13
Freedom of choice. Concept and content	1988	European Economic Review	139	14
Missing women - Revisited	2003	British Medical Journal	138	15
Welfare, preference and freedom	1991	Journal of Econometrics	134	16
Markets and freedoms: Achievements and limitations of the market mechanism in promoting individual freedoms	1993	Oxford Economic Papers	131	17
Social choice theory (Chap 22)	1986	Handbook of Mathematical Economics	120	18
Informational bases of alternative welfare approaches. Aggregation and income distribution	1974	Journal of Public Economics	119	19
The hidden penalties of gender inequality: Fetal origins of ill-health	2003	Economics and Human Biology	112	20
Public action and the quality of life in developing countries.	1981	Oxford Bulletin of Economics and Statistics	106	21

In every research, citation is considered as common benchmark to evaluate the impact and quality of the research publication. The more numbers of authors referred a paper, the more numbers of citations will be incurred and simultaneously it will favour in the rise of h-index of the publishing journal/ book and the researcher/author. In this study an attempt has been made to identify the more than 100 times cited papers of Dr. Amartya Sen. It is seen that out of 111 papers highest 89(80.1%) papers are cited by different authors and 21(18.9%) papers are more than 100 times cited papers. The paper entitled “Elements of a theory of human rights” published in the year 2004 has been cited highest 336 times and ranked 1st amongst his all publications, followed by the paper “Poor, relatively speaking” published in the year 1983 has been cited 325 times and ranked 2nd and the paper “Democracy as a universal value” published in the year 1999 has been cited 294 times and ranked 3rd etc.

Key Areas of Research in Dr. Amartya Sen's Publication

Table 4. Key Areas of Research in Dr. Amartya Sen's Publication

Subject Area	Publications (n=111)	Percentage (%)
Economics, Econometrics and Finance	62	55.86
Other Social Sciences	61	54.95
Arts and Humanities	19	17.12
Medicine	17	15.32
Business, Management and Accounting	10	9.01
Mathematics	10	9.01

Subject Area	Publications (n=111)	Percentage (%)
Environmental Science	8	7.21
Decision Sciences	6	5.41
Pharmacology, Toxicology and Pharmaceutics	5	4.50
Agricultural and Biological Sciences	3	2.70
Earth and Planetary Sciences	3	2.70
Biochemistry, Genetics and Molecular Biology	2	1.80
Health Professions	1	0.90
Multidisciplinary	1	0.90

Subject Area	Publications (n=111)	Percentage (%)
Nursing	1	0.90
Psychology	1	0.90

Table 4 shows the key areas of research in Dr. Amartya Sen's publications. As he was a professor and expert of Economics, his publications were not limited to only this field, rather the publications have covered to the various applied fields of economics. Econometrics and Finance has been identified as top area of research with 62(55.86%) papers followed by other social sciences 61(54.95%) papers, Arts & Humanities 19(17.12%), Medicine 17(15.32%) etc. His other prominent areas of research are Business, Management and Accounting, Mathematics etc.

Affiliated Institutions in Dr. Amartya Sen's Publications

Table 5. Affiliated Institutions in Dr. Amartya Sen's Publications

Institution Name	Country	Publications (n=111)	Percentage (%)
Harvard University	United States	53	47.74
Trinity College, Cambridge	United Kingdom	20	18.01
London School of Economics and Political Science	United Kingdom	8	7.21
Lamont University	United States	8	7.21
All Souls College	United Kingdom	7	6.31
University of Cambridge	United Kingdom	4	3.6
St. Catherine's College	United Kingdom	1	0.9
Université de Harvard	United States	1	0.9
American Economic Association	United States	1	0.9
American Academy	United States	1	0.9
Nuffield College, University Of Oxford	United Kingdom	1	0.9
Stanford University	United States	1	0.9
University of Ulster	United Kingdom	1	0.9
Waseda University	Japan	1	0.9
University of Oxford	United Kingdom	1	0.9
Muhlenberg College	United States	1	0.9
School of Economics, University of Delhi,	India	1	0.9

Table 5 reveals that Dr. Amartya Sen has spent most of his research and professional time in United States and United Kingdom. Out of the 111 publications highest 53(47.74%) publications have been published under the affiliation of Harvard University, USA which is nearly half of the

total publications and 20(18.01%) publications have been published under the affiliation of Trinity College, UK and interestingly only 1 publication has been published under the affiliation of School of Economics, University of Delhi, India as the birth place of Dr. Sen is India.

Ranking of Source Journals containing Dr. Amartya Sen's Publications

Table 6. Ranking of Source Journals Containing Dr. Amartya Sen's Publications

Source Title	Publications	Percentage (%)	Impact Factor	SCImago (2015)
Lancet	4	3.60	45.217	14.638
British Medical Journal	3	2.70	17.445	2.568
World Development	4	3.60	1.537	2.1
Cambridge Journal of Economics	3	2.70	1.311	0.957
Feminist Economics	3	2.70	1.067	0.548
Journal of Economic Theory	3	2.70	1.033	2.587
Food Policy	3	2.70	1.799	1.174
Theory and Decision	3	2.70	0.710	0.8
Economics and Philosophy	3	1.80	0.688	0.624
Social Choice and Welfare	2	1.80	0.590	0.841
International Labour Review	3	2.70	0.340	0.358
New York Review of Books	7	6.31	-	0.112
Oxford Economic Papers	5	4.50	-	0.928
Handbook of Social Choice and Welfare	2	1.80	-	-
Journal of Economic Methodology	2	1.80	-	0.278
New Republic	2	1.80	-	0.106
Economic Journal	3	1.80	-	3.39
58 numbers of Different Journals containing each 1 publication	58	52.25	-	-

A total numbers of 74 journals have been identified, in which the publications of Dr. Amartya Sen has been published. The journals have been identified with their Web of Science impact factor and SCImago Journal ranking value. Table 6 shows the ranking of journals in decreasing order based on their Web of Science Impact Factor and followed by SCImago Journal ranking. Dr. Sen has published highest 7 papers in New York Review of Books followed by 5 papers in Oxford Economic Papers and 4 papers each in Lancet and World Development. A total numbers of 58 journals have been identified with each 1 publication.

FINDINGS & CONCLUSION

The findings of the study are presented as:

- Prof Sen was awarded with Nobel Prize in Economics in the year 1998, when he was a man of 65 years old with 44 research publications and Bharat Ratna, the great Civilian Award of Government of India in the year 1999, at the age of 66 with 48 research publications,
- Prof Sen has published 6 papers with two authors collaboration, 4 papers with three authors collaboration and 1 paper with four authors collaboration.

- The paper entitled “Elements of a theory of human rights” published in the year 2004 has been cited highest 336 times and ranked 1st amongst his all publications, followed by the paper “Poor, relatively speaking” published in the year 1983 has been cited 325 times and ranked 2nd and the paper “Democracy as a universal value” published in the year 1999 has been cited 294 times and ranked 3rd etc
- Econometrics and Finance has been identified as top area of research that prof Sen undertaken
- Prof Amartya Sen has spent most of his research and professional time in United States and United Kingdom.
- Prof. Amartya Sen has published his papers in 74 journals in all.

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