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Scientometric Analysis of Dr. Jayant Narlikar: an Indian Astrophysicist

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Abstract

The present paper attempts to present the various characteristics of the research publication of Dr. Jayant Narlikar, the great astrophysicist and founder of Inter-University Centre for Astronomy and Astrophysics (IUCAA). The present study is based on the publication data indexed in Web of Science database during 1964 to 2021. A total number of 212 articles have been retrieved from the source database for the mentioned span. 212 articles are distributed in various facets which include from single authorship to multiple authorship pattern, domain wise contributions, year wise distributions, authorship pattern & collaboration and channels of communication.

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1. Introduction

Scientometrics is an application of quantitative methods used in the history science. It is one of the techniques for documenting works of eminent scientists and scholars. Scientometric portrait deals with the quantitative (how much) and qualitative (in which) documentation of the communication of science by a given scientist.

Dr. Jayant Narlikar was born on July 19, 1938, in Kolhapur, Maharashtra. He completed his B.Sc. degree BHU in 1957. He got his Cambridge degree in mathematics B.A. (1960), Ph.D. (1963) and Sc.D. (1976). When he returns to India and join Tata Institute of Fundamental Research (1972-1989). He was founder director of Inter-University Centre for Astronomy and Astrophysics (IUCAA) and till his retirement in 2003 he was director of IUCAA. He is now Emeritus Professor at IUCAA. In 1965 he was awarded Padma Bhushan, at the young age of 26. In 2004 he was awarded Padma Vibhushan. The Government of Maharashtra honored him with the Maharashtra Bhushan. Dr. Narlikar has been awarded many national and international awards and honorary doctorates and prestigious awards by the top universities and institutes around the world.

2. Objectives of the study

The main objectives of this study are to analyze the qualitative and quantitative attribution on Dr. Jayant Narlikar's publications applying Scientometric tools and methods. The present study aims are as follows.

- To find out the year-wise growth of publications.
- To identify the authorship pattern.
- To find out core collaboration of Dr. Jayant Narlikar in his research career.
- To identify core communication channels of his research communication.

3. Review of Related Study

Kalyane and Kalyane (1993) ^[1] who for the first time used the phrase "Scientometric Portrait" to conduct bio-bibliometric studied on scientists, Kalyane (1995) ^[2] sketched a scientometric portrait of P.M.Bhargava, a biological scientist and depicted the impact of his contributions in details, Kademani, *et al.* (1999) ^[3] analyzed research contribution of Nobel laureate S. Chandrasekhar, eminent scientist in the

astrophysics Kademani, *et al.* (2000) ^[4] done a bibliometric study of vikram Ambalal Sarabhai. The study analyzed all subtle aspect of his scientific productivity. Tilak Hazarika, *et al.* (2001) ^[5] conducted scientometric portrait of Nobel laureate Ahmed Hassan Zewail, and a great scientist in the field of chemistry with regard to his 246 papers and revealed various dimension of his entire publication. Ahirrao M.K. and Sonawane S.S (2012) ^[6] made study on authorship pattern in Journal of Organic Chemistry and analyzed 6689 articles in which applied Scientometric techniques are being used for a variety of purposes like determination of various scientific indicators, evaluation of scientific output, selection of journals for libraries and even forecasting the potential of a particular field. Ahirrao M.K. and Sonawane S.S (2018) ^[7] analyzed author productivity in Journal of Organic Chemistry during 2009-2013 and studied 1479 articles and founded that multiple authored productivity is more the single. Amit Kumar Das (2021) ^[7] has suggested that ‘scientometric portrait’ is the appropriate phrase for the studies on eminent

scientist. However, the present study objective is to present yet another eminent scientist which has not yet been explored.

4. Methodology

Web of Science was used to retrieve research output of Dr. Jayant Narlikar. A total of 226 paper published by Dr. Jayant Narlikar during 1964-2021. The data acquired for study from the Web of Science database on March 10, 2024 and then the data were analysed using MS-Excel as per objectives of the study.

5. Result and Discussion

5.1. Year-wise Publication of Dr. Jayant Narlikar

Dr. Jayant Narlikar has published 212 in his research career of 58 years (1964-2021). He has published 63 single authored papers (29.72 percent) and 149 multi-authored papers (70.28percent). In 1964 he was published his first paper at the age of 26 years old and last paper was in 2021 at the age of 83.

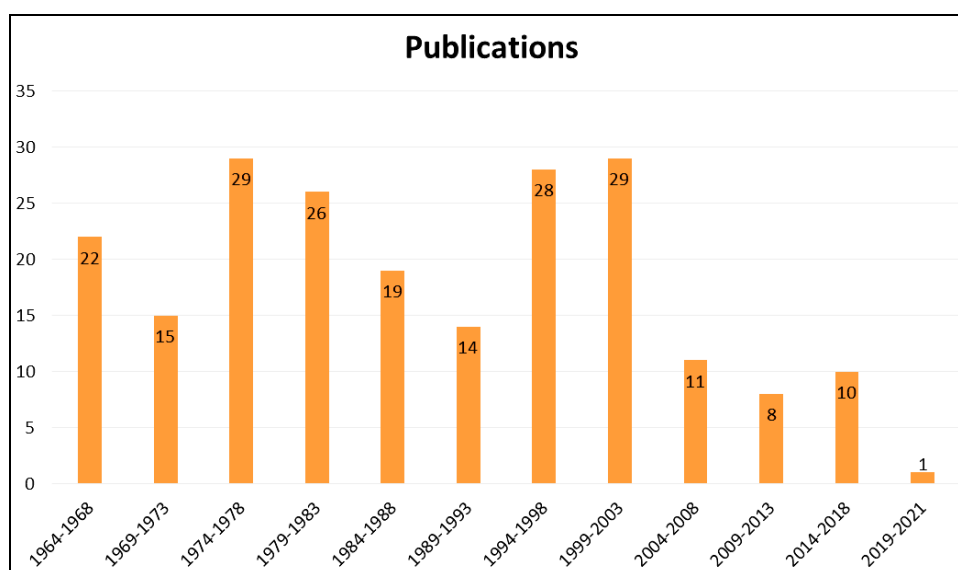


Fig 1: Year-wise Publication of Dr. Jayant Narlikar

Table 1: Publications of Dr. Jayant Narlikar

Year	Publications
1964-1968	22
1969-1973	15
1974-1978	29
1979-1983	26
1984-1988	19
1989-1993	14
1994-1998	28
1999-2003	29
2004-2008	11
2009-2013	8
2014-2018	10
2019-2021	1
Total	212

Table No. 1 presents the data of five years distribution of Dr. Jayant Narlikar. During the period of 1964-2021, a long 58 publication years, he has contributed a total number of 212

articles. His first article has been published in the year 1964, at the age of 26 years old. It is observed that from the above table he published maximum 29 papers in period 1999-2003

5.2. Authorship Pattern of Publications

Table 2: Authorship Pattern publication of Dr. Jayant Narlikar

Age of Dr. Jayant Narlikar	Year of Publication	Number of Papers under different Authorship		Total	Publishing Age
		Single Authored	Multi-Authored		
26	1964	0	7	7	1
27	1965	0	0	0	2
28	1966	3	5	8	3
29	1967	0	2	2	4
30	1968	1	4	5	5
31	1969	0	3	3	6
32	1970	2	2	4	7
33	1971	0	2	2	8
34	1972	0	5	5	9
35	1973	1	0	1	10
36	1974	2	2	4	11
37	1975	1	7	8	12
38	1976	0	7	7	13
39	1977	3	2	5	14
40	1978	2	3	5	15
41	1979	1	2	3	16
42	1980	0	5	5	17
43	1981	1	3	4	18
44	1982	0	5	5	19
45	1983	4	5	9	20
46	1984	2	3	5	21
47	1985	2	6	8	22
48	1986	0	3	3	23
49	1987	1	0	1	24
50	1988	0	2	2	25
51	1989	1	1	2	26
52	1990	1	2	3	27
53	1991	0	3	3	28
54	1992	0	2	2	29
55	1993	1	3	4	30
56	1994	2	4	6	31
57	1995	1	4	5	32
58	1996	3	3	6	33
59	1997	1	6	7	34
60	1998	0	4	4	35
61	1999	4	5	9	36
62	2000	5	1	6	37
63	2001	1	2	3	38
64	2002	0	3	3	39
65	2003	3	5	8	40
66	2004	0	2	2	41
67	2005	3	1	4	42
68	2006	0	3	3	43
69	2007	0	2	2	44
70	2008	0	0	0	45
71	2009	1	2	3	46
72	2010	4	1	5	47
73	2011	0	0	0	48
74	2012	0	0	0	49

75	2013	0	0	0	50
76	2014	1	0	1	51
77	2015	2	1	3	52
78	2016	1	0	1	53
79	2017	0	0	0	54
80	2018	1	4	5	55
81	2019	0	0	0	56
82	2020	0	0	0	57
83	2021	1	0	1	58
Total		63	149	212	
Percentage		29.72	70.28	100	

Table 2 represents the year-wise distribution of the articles authored by Dr. Jayant Narlikar. It is very interesting to note that the trend of research is in favors of team research. Among

212 articles it is observed that multiple authored papers (149) far more than single author papers (63).

5.3. Collaboration of Publications

Table 3: Degree of Collaboration

Age of Dr. Jayant Narlikar	Year of Publication	Number of Papers under different Authorship		Total	Degree of Collaboration
		Single Authored	Multi-Authored		
26	1964	0	7	7	1
27	1965	0	0	0	0
28	1966	3	5	8	0.625
29	1967	0	2	2	1
30	1968	1	4	5	0.8
31	1969		3	3	1
32	1970	2	2	4	0.5
33	1971	0	2	2	1
34	1972	0	5	5	1
35	1973	1	0	1	0
36	1974	2	2	4	0.5
37	1975	1	7	8	0.87
38	1976		7	7	1
39	1977	3	2	5	0.4
40	1978	2	3	5	0
41	1979	1	2	3	0.6
42	1980		5	5	1
43	1981	1	3	4	0.75
44	1982		5	5	1
45	1983	4	5	9	0.55
46	1984	2	3	5	0.6
47	1985	2	6	8	0.75
48	1986		3	3	1
49	1987	1	0	1	0
50	1988		2	2	1
51	1989	1	1	2	0.5
52	1990	1	2	3	0.66
53	1991		3	3	1
54	1992		2	2	1
55	1993	1	3	4	0.75
56	1994	2	4	6	0.66
57	1995	1	4	5	0.8
58	1996	3	3	6	0.5
59	1997	1	6	7	0.85

60	1998		4	4	1
61	1999	4	5	9	0.55
62	2000	5	1	6	0.16
63	2001	1	2	3	0.66
64	2002		3	3	1
65	2003	3	5	8	0.625
66	2004		2	2	1
67	2005	3	1	4	0.25
68	2006		3	3	1
69	2007		2	2	1
70	2008			0	0
71	2009	1	2	3	0.66
72	2010	4	1	5	0.2
73	2011			0	0
74	2012			0	0
75	2013			0	0
76	2014	1	0	1	0
77	2015	2	1	3	0.33
78	2016	1	0	1	0
79	2017			0	0
80	2018	1	4	5	0.8
81	2019			0	0
82	2020			0	0
83	2021	1		1	1
Total		63	149	212	33.9
Percentage		29.72	70.28	100	Average Degree of Collaboration =0.58

Figure 2 depicts that out of 212 publications, 63 papers has published by single author contribution, 89 papers published with two authors, 34 papers contributed by three authors, 11 papers by four authors, 7 papers by five authors, 3 papers by

six authors, 1 paper by eight authors, 3 papers thirteen authors, during his research publication span paper contributed by fifteen authors.

Research Collaboration of Dr. Jayant Narlikar

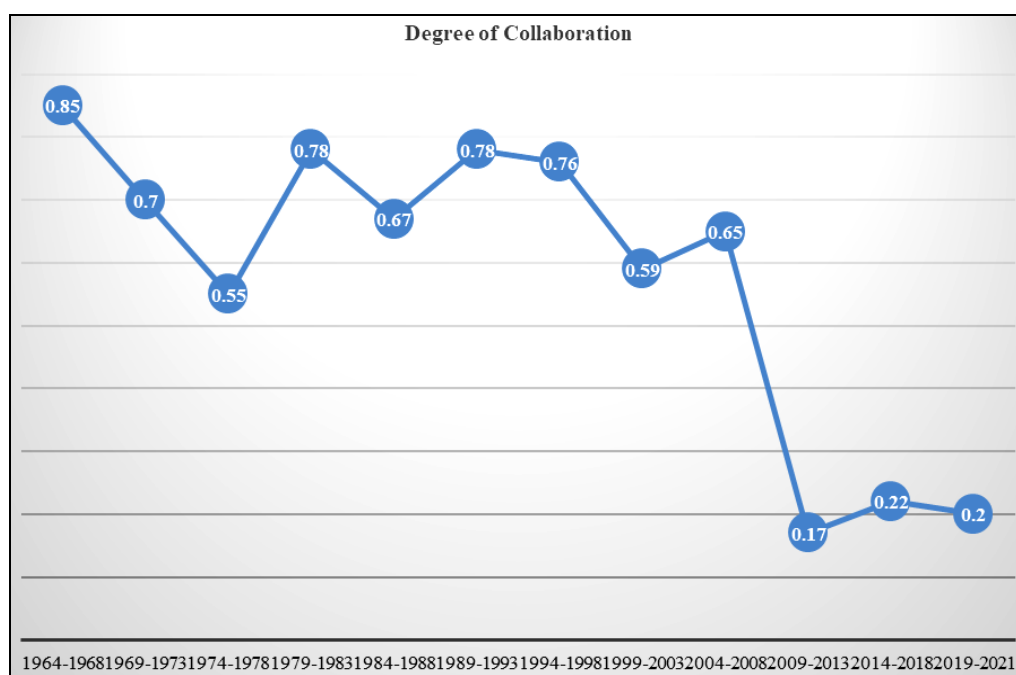


Fig 2: Degree of Collaboration

Figure 2 shows that, the degree of collaboration is found to be 0.85. in 1967-68 year. From above that that in 1964-68. It is

found that the less degree of collaboration 0.2 in 201-21 and average degree of collaboration 0.58.

5.4. Channels of Communication

Table 4: Channels for Preferred for Publishing Journal Articles

Sr. No.	Source Title	No of Publication
1	Nature	26
2	Current science	20
3	Monthly notices of the royal astronomical society	18
4	Astrophysical journal	15
5	Astrophysics and space science	13
6	Journal of astrophysics and astronomy	13
7	Proceedings of the royal society of london series a-mathematical and physical sciences	10
8	General relativity and gravitation	7
9	Physics letters a	7
10	Foundations of physics	6
11	Annals of physics	5
12	Astronomy & astrophysics	5
13	International journal of modern physics d	4
14	Annual review of astronomy and astrophysics	3
15	Physics today	3
16	Other	57
Total		212

From table 4 is found that Dr.Jayant Narlikar preferred various channels in which journals are one of them. He published his 26 articles in Nature Journal while 20 articles are in Current Science.

Conclusion

Dr. Jayant Narlikar has a brilliant research and academic career. He is the pioneer in astrophysics and astronomy of India. The present paper reveals that Dr. Jayant Narlikar during his 58 years, which he has published 212 papers. It found that the average degree of collaboration is 0.58. Highets article (nine) is published in 1983 and 1999.

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