

## RESEARCH CONTRIBUTION OF SAVITRIBAI PHULE PUNE UNIVERSITY (SPPU): A BIBLIOMETRIC ANALYSIS

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### ABSTRACT -

The current study used bibliographic data to examine the research productivity of the Savitribai Phule Pune University (SPPU) in Maharashtra, India. The study's goal was to examine research productivity over 31 years (1990-2020). It covers publication format, the most prolific author, preferred source of publication, subject wise research productivity, author collaboration with national and worldwide, and the author with the highest H-Index. The bibliographic and citation data were sourced from the Web of Science (WoS) database. Bibliometric techniques were applied to analyse the data, and tools such as Bibexcel, Biblioshiny, Hiscite, and Ms-excel were used to analyse a total of 8602 records. The major findings reveal that the number of research publications and citations at the SPPU has increased over the last ten years. SPPU faculty members collaborate well both within India and with researchers around the world. Chemistry was discovered to be SPPU's dominant research area.

**Keywords** - Author Collaboration, Bibliometric, H-Index. Research Productivity, Web of Science

### INTRODUCTION

In today's condition, it is common belief that developing countries may not have sustained growth if they lack of good quality educational and research institutes. Therefore, for developing countries, it is most important to have quality educational institutes, basic infrastructure and skilled human resources. In Maharashtra and in particular in Pune city, such reputed Institutions known for quality education and basic infrastructure required for this is available. Pune is one of the progressive cities from Western Maharashtra in India and Savitribai Phule Pune University (SPPU) is well recognized all over the world which has also earned reputation as Oxford of Eastern World.

Savitribai Phule Pune University was earlier named as Pune University which was established in 1949. Since establishment, Pune University has become one of the important centres among Research and Educational Institutes of the Country. The 411 acres, peaceful and still equipped with all modern amenities, campus of Pune University in northern-eastern region of Pune city offers an ideal environment for numerous research students to pursue their research interest in various fields. Pune University has more than 40 departments that provide comprehensive educational programs. In very less time, Pune University has set very high standards in various areas of Research and Teaching and still continuing in pursuance of excellence.<sup>2</sup> In view of this, we studied in this paper the great emphasis Pune University has made in Research areas.

For this study, we have used bibliometric analysis as a tool in which we evaluated the scientific contributions published by all researchers in the Pune University. In Bibliometric analysis, only those articles which are published in English on Web of Science have been included. The major objective of this research paper is to analyze the research articles published by all the researchers in Savitribai Phule Pune University. For this, the papers published over a period of 31 years (i.e. from 1990 to 2020) and the citations received by these articles, collaborations and authorship patterns have been considered.

## REVIEW OF LITERATURE

Bibliometric studies have been done by many researchers so far. In this, it seems to have shed light on the research work of a city as well as organizations as well as the productivity of the

department, the range of studies and the research done over a specific period of time. We review some such references.

Pandita (2013) analyzed the research output and contribution made by 310 research articles published in the year during 2002-2012. Author identified the most of the authors (about 65%) published the research papers with co-authors. She also founds that the average of 17.11 references have been assigned to each article.<sup>3</sup>

Maharana (2013) in this analysis clears the research output of Sambalpur University's publications in IST Web of Science during the period of 2007 to 2011. He analyzed total 170 research papers. He found the most cited papers with self citations and without citations and H-index of authors. Also he found that the chemistry department was the most favored in area of research in Sambhalpur University. He has stated that the publication range of the university has an annual average growth rate of 30.53%.<sup>4</sup>

Nagarkar (2015) in her study focused on the seven life sciences department of Savitribai Phule Pune University, Pune (formally known as University of Pune). She collected data from WoS database during the period of 1999-2013. She found that total 690 papers published in 362 Journals and total 6210 citation received. She also examined the points of productivity of faculty members of life sciences, authorship patterns, collaborations with reputed institutes like Bhabha Atomic Research Centre (BARC), National Chemical Laboratory, Agharkar Research Institute etc.<sup>5</sup>

Khan (2015) studied the research productivity of Government Medical College, Jammu. In his

study, he studied around 18 departments and their research publications with the help of Scopus database. The results showed that the total 514 publications were published by various departments during the period of 1973 to 2011 and he founds that General Medicine, Pathology and Surgery Department achieved 1<sup>st</sup> rank for paper publication with 97 (18.87%) publications in the Government Medical College Jammu. The Majority of publications were published with co-authors and their percentage was 91.44. Pediatrics Departments publications was the highly cited in the Government Medical College Jammu.<sup>6</sup>

Lihitkar's (2019) study is based on Scientific Publications of Shivaji University, Kolhapur during the period of 1989 to 2018. For this study, authors used Web of Science for data collection. The finding of this study was, the Material Science is at the top of the list in research area of Shivaji University and achieved 30.44% of all the research output. The study shows 92% research papers published as research journal articles. The Local Citation score of Shivaji University was found 850 and Global Citation Score founds 65924.<sup>7</sup>

Garg (2020) examined the growth of articles published during the 28 years of 1992 to 2019 in block of four years each. For his study he analyzed total 910 research papers. By this study the DRDO-DESIDOC, New Delhi is the most prolific Institutions with the 128 research papers with 7.5%. In the most prolific authors he found S.M. Gupta topped the list. Lastly he advised that journals should take efforts to attract authors for working abroad for publications.<sup>8</sup>

For the present study, we looked at records published from 1990 to 2020, a period of thirty-one years from SPPU, Pune. From the Web of Science, a total of 8602 records were retrieved from this period published by SPPU. The details are as below:

### **OBJECTIVES OF THE STUDY**

- To investigate the types of documents produced by SPPU faculties
- To measure the year wise research outcome of SPPU from 1990 to 2020
- To identify the journals preferred by SPPU faculties to publish their research
- To identify the most productive author of SPPU
- To study the subject wise research productivity of SPPU from 1990 to 2020
- To analyse the collaboration of SPPU faculty members with national and international authors for research publication.
- To find out the highest H-Index holder author among SPPU faculty

### **METHODOLOGY**

The current study is based on a bibliometrics analysis of research publications from Savitribai Phule Pune University. For this, bibliographic data was taken from the Web of Science database (<https://clarivate.com>). The biblioshiny application(<https://www.bibliometrix.org/Biblioshiny.html>) was used to do the bibliometric analysis of the extracted data. Biblioshiny is a great tool for drawing inferences from bibliometric data. Bibexcel, Biblioshiny, Hiscite, and Ms-excel are some of the tools used to analyse bibliographic records.

**Table No.1. Types of Documents**

Sr. No.	Types of Documents	Num. of Documents	TGCS
1	Article	7618	149452
2	Proceedings Paper	312	3817
3	Review	289	15006
4	Meeting Abstract	118	13
5	Editorial Material	95	260
6	Letter	90	688
7	Book Review	32	1
8	Article; Early Access	20	25
9	Biographical-Item	11	0
10	Book Chapter	7	107
11	News Item	5	5
12	Retracted Publication	4	51
13	Film Review	1	1
	Total	8602	

Table No.1 describes types of documents published by SPPU faculties. The above analysis shows that SPPU faculty published 7618 Research articles from 1990 to 2020. It means 90% of SPPU research published through

Research articles in various journals. SPPU faculties also published their work in Conference proceedings (312), Review (289), Meeting abstract (118) and Editorial (95).

**Table No.2. Year wise publication of Documents**

Sr. No.	Publication Years	Total Document per year	Percentage	Average Citation Per year
1	1990	125	1.45%	0.58
2	1991	156	1.81%	0.6
3	1992	142	1.65%	0.49
4	1993	124	1.44%	0.66
5	1994	117	1.36%	0.6
6	1995	113	1.31%	0.54
7	1996	122	1.42%	0.64
8	1997	132	1.54%	0.79
9	1998	133	1.55%	1.1
10	1999	131	1.52%	1.05
11	2000	106	1.23%	1.29
12	2001	126	1.47%	1.12
13	2002	135	1.57%	1.81
14	2003	136	1.58%	2.46

15	2004	150	1.74%	1.82
16	2005	189	2.20%	1.86
17	2006	250	2.91%	2.16
18	2007	261	3.03%	1.9
19	2008	288	3.35%	1.98
20	2009	297	3.45%	2.33
21	2010	348	4.05%	2.61
22	2011	339	3.94%	2.05
23	2012	355	4.13%	2.18
24	2013	363	4.22%	2.45
25	2014	393	4.57%	3.01
26	2015	413	4.80%	2.83
27	2016	600	6.98%	6.1
28	2017	578	6.72%	3.55
29	2018	564	6.56%	5.36
30	2019	663	7.71%	2.73
31	2020	643	7.48%	3.75

Table No.2 reflects year wise publications with average citations of SPPU during 1990 to 2020. The research outcome of SPPU has been increased throughout the years. The table shows that in the year 2019 SPPU contributed 663 (7.71 %) highest numbers of publications and in the year 2020 SPPU got the highest (3.75 %) average

citations. It is observed that research outcome of SPPU has been increased in last five years like 2020 (643), 2019 (663), 2018 (564), 2017 (578) and 2016 (600) as compared to early ninety i.e.1990 (125), 1991 (156), 1992 (142), 1993 (124) and 1994 (117).

**Table No. 3. Top Twenty Journals preferred by SPPU faculties for Publication**

Sr. No.	Journal Title	Total Publication	H index	G index	M index	Total Citations
1	Current Science	190	19	38	0.87879	2946
2	Monthly Notices of the Royal Astronomical Society	150	25	37	0.60606	1109
3	Journal of Applied Physics	93	26	50	1.29032	12376
4	RSC Advances	93	22	30	0.51613	905
5	Journal of Materials Science- Materials in Electronics	91	19	33	0.57576	1771
6	Astronomy & Astrophysics	89	40	85	0.78788	2742
7	Journal of physical chemistry a	81	29	46	0.84849	2398
8	Journal of the geological society of india	77	14	19	0.73077	1284

9	Physical review b	77	27	48	1.16	2424
10	Applied physics letters	70	29	53	0.4375	521
11	Journal of chemical physics	65	28	48	0.60606	1364
12	Applied surface science	61	20	30	0.78125	2115
13	Nuclear instruments & methods in physics research section b-beam interactions with materials and atoms	59	14	20	0.45161	560
14	Tetrahedron letters	58	20	28	0.81818	2457
15	Thin solid films	57	16	36	0.62069	1138
16	Materials letters	55	20	35	1.25	1272
17	Physical review e	54	18	32	2.2	1359
18	Plos one	54	20	34	1.63636	932
19	Scientific reports	53	18	29	0.60606	1010
20	Astrophysical journal	52	16	28	0.48485	1420

**TP-Total publication**

Table No.3 reveals top twenty sources of publications preferred by SPPU faculty to publish their research work. The above analysis indicates that current science journal secured first rank in the table with 190 publications, H-Index 19 and total Citations 2946. It is observed that current science journal is most preferred journal among

SPPU faculty to publisher their research. Along with current science journal SPPU faculty consistently publish their research work in Monthly Notices of The Royal Astronomical Society (TP.150), Journal of Applied Physics (TP.93) RSC Advances (TP.93) and Journal of Materials Science-Materials in Electronics

**Table No.4. Most prolific authors**

Sr.No.	Authors	No.Publication	H Index	G Index	M Index	Total Citation
1	More MA	195	34	52	1.133	3993
2	Gadre SR	158	44	71	1.333	5823
3	Kulkarni SK	158	41	78	1.242	6662
4	Ogale SB	158	31	53	0.939	3306
5	Bhoraskar VN	155	17	29	0.515	1460
6	Padhye S	141	36	61		4317
7	Bhoraskar SV	140	26	47	0.788	2799
8	Gejji SP	140	20	35	0.8	1816
9	Dhavale DD	136	32	46		3030
10	Dhole SD	134	17	31	0.548	1400
11	Kanhere DG	109	32	43	0.97	2475
12	Gosavi SW	104	26	46	1.04	2485
13	Joag DS	102	28	49	0.848	2797

14	Mathe VL	102	24	37	1.6	1739
15	Aiyer RC	97	23	43	0.697	2129
16	Shouche YS	94	27	44	1.08	2308
17	Mahamuni S	91	29	55	0.879	3284
18	Late DJ	84	28	49	1.556	2695
19	Singh S	83	20	38	0.645	1579
20	Patwardhan B	81	28	54	0.875	3039

Table No.4 reflects most productive authors in SPPU. It is observed that M.A. More got highest rank in table with 195 publications, H-Index-34 and 3993 total citations. In the table Prof. S.R.Gadre secure second rank with 158 publications in the table also he got large number of citations (5823) for his research publications.

As mentioned above in the table Prof. Kulkarni has 158 publications on his account but he got highest number of Citations 6662 for his research publication. From the table it clears that SPPU faculty produce quality research in their respective areas.

**Table No.5 Subject wise Research contribution**

Sr. No.	Prominent Area of Research	Number of Publication	Percentage
1	Chemistry	2228	25.901
2	Physics	2013	23.402
3	Materials science	1295	15.055
4	Science technology other topics	746	8.672
5	Biochemistry molecular biology	570	6.626
6	Engineering	564	6.557
7	Astronomy astrophysics	495	5.754
8	Mathematics	388	4.511
9	Biotechnology applied microbiology	367	4.266
10	Pharmacology pharmacy	292	3.395
11	Environmental sciences ecology	257	2.988
12	Geology	241	2.802
13	Nuclear science technology	210	2.441
14	Plant sciences	194	2.255
15	Biophysics	184	2.139
16	Instruments instrumentation	165	1.918
17	Microbiology	164	1.907
18	Meteorology atmospheric sciences	156	1.814
19	Optics	154	1.79
20	Cell biology	129	1.5

It is clearly retrieved through Table No.5 that chemistry (2228) is most productive subject area of research in SPPU. Out of all the subjects or departments 25.9% of research publication published in Chemistry. Along with chemistry

other subjects also have good number of research publications like physics (TP.2013, 23%), Material Science (TP.1295, 15.05%), Science technology and other topics (TP.746, 8.6%) and Biochemistry Molecular Biology (TP.570, 6.6%)

**Table No.6 Collaboration with other countries**

Sr. No.	Country	Records	SCP	MCP	Total Citations	Average Article Citations
1	India	7277	6204	1073	124961	17.17
2	USA	268	40	228	17160	64.03
3	Germany	76	2	74	2132	28.05
4	United Kingdom	71	4	67	7985	112.46
5	Iran	55	2	53	959	17.44
6	Korea	55	1	54	1105	20.09
7	France	43	2	41	3057	71.09
8	China	37	0	37	447	12.08
9	Italy	37	0	37	1612	43.57
10	Canada	35	9	26	708	20.23
11	Australia	34	1	33	631	18.56
12	Sweden	22	0	22	525	23.86
13	Japan	17	0	17	291	17.12
14	Spain	17	0	17	481	28.29
15	Turkey	16	0	16	474	29.62
16	Netherlands	13	0	13	592	45.54
17	Switzerland	9	0	9	35	3.89
18	Finland	8	0	8	136	17

Table No.6 shows author collaboration with other countries. With the above analysis it is observed that SPPU faculties publish 7277 papers in collaboration with Indian authors and they got 124961 citations for their research publications.

SPPU faculties also publish their research with USA (TP. 268, TC.17160), Germany (TP.76, TC.2132), United Kingdom (TP.71, TC.7985) and Iran (TP.55, TC.959)

**Table No. 7 Group wise author H-Index**

Sr. No.	H Index	Total Authors
1	more than 40	2
2	35 to 39	67
3	30 to 34	110
4	25 to 29	54



5	20 to 24	24
6	15 to 19	58
7	10 to 14	203
8	5 to 9	1651
9	0 to 4	17859

The H-index of the authors of SPPU is shown in the above table as per group. Only two authors have an H-index of more over 40, The top two authors as Gadre S.R. secured 1<sup>st</sup> rank with 44 H-Index and Kulkarni S.K. is second with 41 H-Index. There are 17859 authors with an H-Index of 0 to 4, and 110 authors with an H-Index of 30 to 34. In addition, 67 authors were ranked between 35 and 39.

### MAJOR FINDINGS

- 90% of SPPU research is published in the form of a research article.
- It has been observed that the number of research publications has increased in the recent ten years when compared to the early 1990s. In addition, average number of citations has increased with the number of publications
- The current science journal is a prominent journal for research publication at the SPPU. The Current Science Journal published 190 research papers between 1990 to 2020.
- Prof. S.A. More is the most productive author among SPPU faculty. He has authored 195 research papers between 1990 to 2020, with an H-Index of 34. In addition, his research publications received 3993 citations.
- In SPPU, chemistry is the most prominent subject of research. Only chemistry has accounted for 25% of all research publications.

- As compared with the international level, the majority of SPPU faculty members work on research with Indian authors.
- There are only two SPPU authors with more than 40 h-index.

### CONCLUSION

The present study evaluates the research contribution of Savitribai Phule Pune University from 1990 to 2020. Total 8602 bibliographical data has been extracted from the web of Science database. To analyse, present and evaluate bibliographical records Bibexcel, Biblioshiny, Hiscite, and Ms-excel applications were used. The study showed that the SPPU publication frequency in the last 10 years has increased. It is observed that in recent years, SPPU authors have produced quality research. It has been found that international SPPU collaboration is less than national collaboration. The SPPU contributes greatly to chemistry in research, but the University should promote other fields for research contribution.

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