Research Article

Research Publication by the Faculty Members of Periyar University, 1998 to 2021: A Scientometric Assessment

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This study evaluates and analyses the contributions made by the faculty members of various departments of Periyar University from1998 to 2021. The study was performed based on the data collected from the web of science database with the affiliation of Periyar University and the analysis was preferred using various scientometric indicators such as the growth of publications, To examine the types of documents, the relative growth rate (RGR), doubling time (DT) and research productivity of individual authors, the journal wise publications, the collaborative institutions, keywords, countries of research contributions.

Keywords: Scientometric, research productivity, publication productivity, publication output, Annual growth rate.

1. Introduction

 The term 'Scientometric was coined by V. Nalimov and Mulchenko in 1969 According to them, Scientometrics is "The quantitative methods which deal with the analysis of science viewed as on information process" Scientometrics is comparing the output as well as the impact of science at national and international levels and is the study of all aspects of the history of science and technology and deals with the analysis, evaluation and graphics and visual representations of them. It can also act as a tool for policy making by measuring and analyzing the discipline. There are different scientometric tools used by different researchers such as citation analysis. Research productivity from any group and individuals has a way to the growth of disciplines concerned. In India, UGC, DBT, ICSSR, DST and many other nodal agencies provide a large amount of money for carrying out research projects.

These initiatives bring out tremendous changes in a field of knowledge faculty needs to be actively involved in teaching general and research publications in particular numbers of collaborative research contributions are very common in any part of the globe.

Periyar University has been re-accredited with an 'A' Grade by National Assessment and Accreditation Council (NAAC) recently and is located in Salem, India. The University has shown tremendous growth in all spheres of its 25 years of existence. It caters to the needs of students from rural areas and downtrodden sections of society in Salem, Namakkal, Dharmapuri, and Krishnagiri, regions. The university receives funds from various agencies such as the UGC, CSIR, DBT, ICMR, ICSSR, and MHRD to carry out research activities by different departments. The university has established exclusive centres for Bioinformatics, Nanoscience and instrumentation.

2. Review of Literature

The Study conducted by Sheri net.al. (2021) on research productivity of the Indian Institute of Science (IISc), Bangalore during 2000-2019 using the web of science retrieved total publications of 29.580 and found that the

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year 2019 witnessed the highest number of publications with 2200 documents and the author with name Kumar found to be the most productive author during this period of with 736 papers.

Pradhan et.al (2020) examined a scientometric assessment of the research output of Sambalpur university from 1990-2019 as reflected in the Scopus database. During this period total of 1527 publications appeared and found that the annual growth rate of the publications is varying from -43.48 to +140.

Mahala and Singh (2020) conducted a scientometric analysis on research publication of Indian universities (2015-2019) by retrieving 26,173 documents from the science citation index of the web of science database and is of the opinion that the most prolific authors are from the medial and physics fields of science.

Marillo and Efrain –Garcia (2015) have investigated the bibliometric analysis on technology centers of Spanish institutional sectors during the period between 2008 to 2012. The study covered TC's main factions and author's performance, degree of national and international collaboration and their major features and author evaluation of scholarly articles etc. for analysis, the data was collected from web of science citations core collection database. The result showed that the total number of 5068 documents and 4586 research articles were published and produced by TCs, It was noticed that Tc,s Scientific impact was slightly higher than the average.

3. Objectives of the study

The main objective of this study is to evaluate the research output of Periyar university during a selected time from 1988 to 2021 based on the data retrieved using the Web of Science (WoS) core collection by the Clarivate analysis Citation and Indexing database. The specific objectives of the study are as follows:

- To examine the year-wise growth of Periyar university's research output
- To know the relative growth rate and doubling time of research publications of Periyar University.
- To examine the types of documents
- To explore the research productivity of individual authors of Periyar university's research output.

- To find out the journal-wise publications of Periyar University research output.
- To explore the collaborative institutions, keywords, countries, and languages of research contribution.

4. Methodology

The data were retrieved from the web of science (WoS) core collection citation and indexing bibliographic database. The string strategies "Affiliation and Periyar University "The time span was set between 1998 to 2021 so as to cover almost all the publications in the database. The total number of publication retrieved from 1868. The bibliographic research work was performed on (12th July 2022.) For data analysis, a descriptive analysis has observed, and the collected data were transferred to Hiscite software for further analysis with objectives of Scientometric indicators such as Relative growth rate and doubling time.

4.1. Relative Growth Rate (RGR)

The Relative Growth Rate (RGR) expresses growth in terms of a rate of increase in the size of publications per unit of time. The publications growth was analyzed using RGR and DT (Mahapata, 1985).The mean Relative Growth rate (R) over the specific period of the interval can be calculated from the following formula.

$$R (1\text{-}2) = W2\text{-}W_1 / T_2\text{-}T_1$$

Where,

R - Mean relative growth rate over the specific period of interval

W1 - Log of the initial Number of Publications

W2 - Log of the Final number of Publications after a specific period of interval

T2-T1 - the unit difference between the initial and final times.

4.2. Doubling Time (DT)

The Doubling time is directly related to RGR. If the numbers of publications or pages of subject double during a given period, and then the difference in the logarithms of numbers at the beginning and end of this period must be logarithms of number 2. If a natural logarithm is used, this difference has a value of 0.693, thus, the formula can calculate the corresponding

doubling time for each specific period of interval and both publications and pages.

$$DT = 0.693 / R$$

Where,

R - Relative Growth Rate

4.3. Time Series Analysis (TSA)

Time series is an ordered sequence of values of a variable at equally spaced time intervals, in other words, we can say that a time series is a sequence of data points, measured typically at successive times, spaced at (aften uniform) time intervals, According to Mooris Hamburg(1970) 'A time series is a set of statistical observations arranged in chronological order'.

$$\text{Equation of straight line } Yc = a + bx$$

Where,

Y - Trend values to be computed

X - Unit of time (Independent variable)

a - Constant to be calculated

b - Constant to be Calculated

5. Data Analysis and Interpretation

Table 1 indicates the chronology-wise distribution of research output which were published and indexed in the web of science database from the year 1998 to 2021. The faculty members of Periyar University started to publish their research work in 1868. The study highlights the TLCS, Total local citation score and TGCS, Total global citation score. Out of 1868 research papers. the highest number of papers 252 (13.5%) during the year 2020 impact of Covid-19 periods that are placed in the first rank in 2020. The highest local citation score is 369 in 2014 and the highest global citation score is 4110 in 2014.

Table.1 Year wise growth of research output

Sl.No	Publication Year	No.of Publications	Percentage (%)	TLCS	TGCS
1	1998	1	0.1	0	0
2	1999	4	0.2	4	44
3	2000	2	0.1	1	7
4	2001	10	0.5	0	84
5	2002	3	0.2	0	7
6	2003	2	0.1	0	14
7	2004	1	0.1	0	8
8	2005	20	1.1	23	577
9	2006	12	0.6	23	366
10	2007	35	1.9	54	422
11	2008	47	2.5	74	1128
12	2009	67	3.6	140	1519
13	2010	81	4.3	150	1926
14	2011	71	3.8	171	1634
15	2012	97	5.2	186	2261
16	2013	109	5.8	189	2251
17	2014	149	8	369	4110
18	2015	149	8	279	2856
19	2016	157	8.4	189	3089
20	2017	168	9	258	3395
21	2018	182	9.7	240	3105
22	2019	204	10.9	128	2364
23	2020	252	13.5	29	2382
24	2021	45	2.4	6	535
	Total	1868	100	2513	34084

Source: Web of Science (WoS)
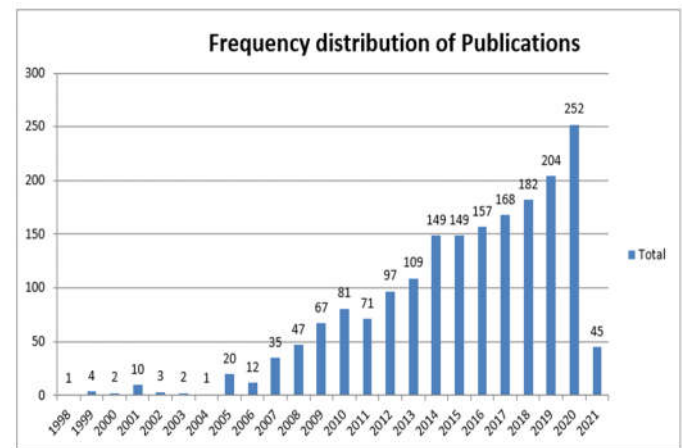
Fig.1. Year wise growth of research output

The growth rate of research publication was analyzed by relative growth Rate (RGR) and Doubling Time (DT) is measured to study the increase in the number of articles and the DT is measured to study the increase in the number of articles and the DT is directly related to RGR. It is the time required for the article to become double the existing amount from 1998 to 2021.RGR was calculated the whole period into one period

intervals from 1998 to 2021 (24 years) It observed that the Relative Growth Rate of Publication has steadily decreased from the first to last. The mean doubling time has shown a declining trend.

Table.2 Relative Growth Rate (RGR) and Doubling Time (DT) of Publications

Sl. No	Publication Year	No. of Publication	Cumilative total	Log$_e$ W1	Log$_e$ W2	RGR	DT
1	1998	1	0	-	0	-	-
2	1999	4	5	0	1.60	1.60	0.43
3	2000	2	7	1.60	1.94	0.34	2.03
4	2001	10	17	1.94	2.83	0.89	0.77
5	2002	3	20	2.83	2.99	0.16	4.33
6	2003	2	22	2.99	3.09	0.10	6.93
7	2004	1	23	3.09	3.13	0.04	17.3
8	2005	20	43	3.13	3.76	0.63	1.10
9	2006	12	55	3.76	4.00	0.24	2.88
10	2007	35	90	4.00	4.49	0.49	1.41
11	2008	47	137	4.49	4.91	0.42	1.65
12	2009	67	204	4.91	5.31	0.4	1.73
13	2010	81	285	5.31	5.65	0.34	2.03
14	2011	71	356	5.65	5.87	0.22	3.15
15	2012	97	453	5.87	6.11	0.24	2.88
16	2013	109	562	6.11	6.33	0.22	3.15
17	2014	149	711	6.33	6.56	0.23	3.01
18	2015	149	860	6.56	6.75	0.19	3.64
19	2016	157	1017	6.75	6.92	0.17	4.07
20	2017	168	1185	6.92	7.07	0.15	4.62
21	2018	182	1367	7.07	7.22	0.15	4.62
22	2019	204	1571	7.22	7.35	0.13	5.33
23	2020	252	1823	7.35	7.50	0.15	4.62
24	2021	45	1868	7.50	7.53	0.03	23.1
	Total	1868	-	-	Mean	0.31	4.36

Source: Web of Science (WoS)

The Straight line equation is applied to arrive at estimates for future growth under the Time Series Analysis

Straight line equation Y c = a + bX

a = ∑y/n = 1868/ 24 = 77.83

b = ∑xy/x^2 = 9734 /1156 = 8.42

Estimate literature in 2025, when X = 2025 - 2010 = 15

=77.83+8.42*15

=77.83+126.3

=204.13

Estimate literature in 2030, when X = 2030 - 2010 = 20

=77.83+8.42*20

=77.83+168.4

=246.23

Table.3 Time series analysis of research publication of Periyar University

Sl.No	Publication Year	No.of Publications	X	X^2	XY
1	1998	1	-12	144	-12
2	1999	4	-11	121	-44
3	2000	2	-10	100	-20
4	2001	10	-9	81	-90
5	2002	3	-8	64	-24
6	2003	2	-7	49	-14
7	2004	1	-6	36	-6
8	2005	20	-5	25	-100
9	2006	12	-4	16	-48
10	2007	35	-3	9	-105
11	2008	47	-2	4	-94
12	2009	67	-1	1	-67
13	2010	81	0	0	0
14	2011	71	1	1	71
15	2012	97	2	4	194
16	2013	109	3	9	327
17	2014	149	4	16	596
18	2015	149	5	25	745
19	2016	157	6	36	942
20	2017	168	7	49	1176
21	2018	182	8	64	1456
22	2019	204	9	81	1836
23	2020	252	10	100	2520
24	2021	45	11	121	495
	Total	1868		1156	9734

Source: Web of Science (WoS)

It is found that the Periyar University faculty members of research output shown an increasing trend and predictable year 2025 and the same trend may also be expected in 2030.Hence; the trend of year wise

productivity will be registered as 204.13 growths in 2025 while in 2030 the growth will be predictable more than 246.23 contributions.

Table.4 Types of Documents

Sl. No	Document type	No.of Publications	%	TLCS	TGCS
1	Article	1781	95.4	2465	31763
2	Review	37	2	26	1888
3	Article; Proceedings Paper	19	1	19	380
4	Meeting Abstract	12	0.6	0	9
5	Correction	8	0.4	1	2
6	Letter	6	0.3	1	32
7	Editorial Material	2	0.1	0	3
8	Article; Retracted Publication	1	0.1	1	6
9	Reprint	1	0.1	0	0
10	Review; Book Chapter	1	0.1	0	1
	Total	**1868**	**100**	**2513**	**34084**

Source: Web of Science (WoS)

Table 4 indicates the types of documents wise distribution of research output which were published and indexed in the web of science database from the year 1998 to 2021. It is evident from the above table that out of 1873 articles a majority of 1786 (95.4%) scientific publications were published in scholarly journals. The TLCS is 2465 and TGCS is 31763.
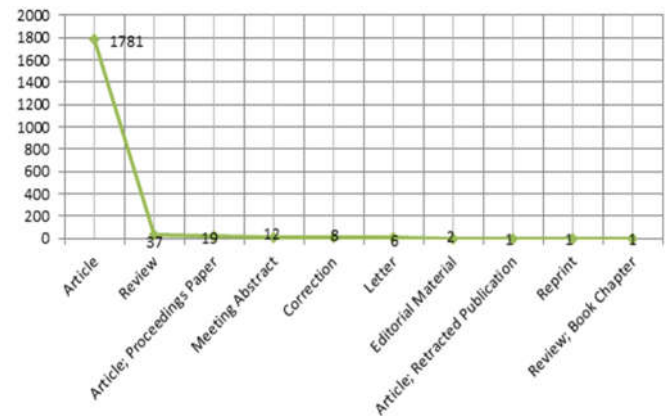

Fig.2. Document types of research output

Table.5 Research productivity of individual authors of top 20 research output

Sl. No	Author	Recs	%	TLCS	TLCS/t	TLCSx	TGCS	TGCS/t	TLCR	TLCSb
1	Krishnakumar V	134	7.2	169	14.12	54	2565	202.3	124	69
2	Gopi D	105	5.6	434	40.09	15	2809	294.16	405	219
3	Kavitha L	102	5.4	401	36.66	12	2657	271.1	386	206
4	Anbarasan PM	90	4.8	136	20.89	27	1277	202.81	132	52
5	Viswanathamurthi P	89	4.8	257	28.19	8	1585	188.85	249	132
6	Kumaradhas P	70	3.7	161	19.67	18	702	100.85	140	41
7	Raj V	65	3.5	104	16.09	5	1224	206.87	115	44
8	Palvannan T	54	2.9	85	9.05	9	1631	206.86	70	37
9	Venkatachalam P	52	2.8	76	10.05	12	1611	232.04	81	41
10	Lalitha A	50	2.7	134	19.77	1	770	108.24	137	63
11	Ramesh R	49	2.6	122	20.09	4	745	161.29	130	48
12	Shivakumar MS	47	2.5	80	12.53	11	703	120.86	68	19
13	Girija EK	43	2.3	100	11.23	18	1101	149.02	84	33
14	Kannan S	43	2.3	90	10.93	9	1356	207.34	88	38
15	Nagalakshmi R	42	2.2	52	3.9	13	724	58.66	48	27
16	Perumal P	40	2.1	61	8.78	22	997	129.74	39	32
17	Balagurunathan R	33	1.8	28	3.13	8	685	84.1	23	12
18	Natarajan D	33	1.8	34	4.74	11	349	59.9	29	12
19	Prakash P	32	1.7	16	1.58	1	817	102.54	15	6
20	Velraj G	32	1.7	34	3.13	3	433	44.55	44	15

Source: Web of Science (WoS)

Table 5 indicates the Research productivity of individual authors of (top 20) Periyar university research output. It can be inferred that individual contributors to scientific articles were ranked during the period. The study shows the TLCS, TGLS, TLCR, TLCSb, and TLCSe. Dr Krishna Kumar has got the first position and his total numbers of research publications are 134 He has got 169 in TLCS, 2565 in TGCS, 124 in TLCR and 69 in TLCSb. And followed by Dr.D.Gopi who occupied the second position with research publication is 105, TLCS is 434, TGCS is 2809, TLCR is 405, and TLCSb is 219. Dr L.Kavitha stood third and her TLCS is 401, TGCS is 2657, and TLCR is 386.
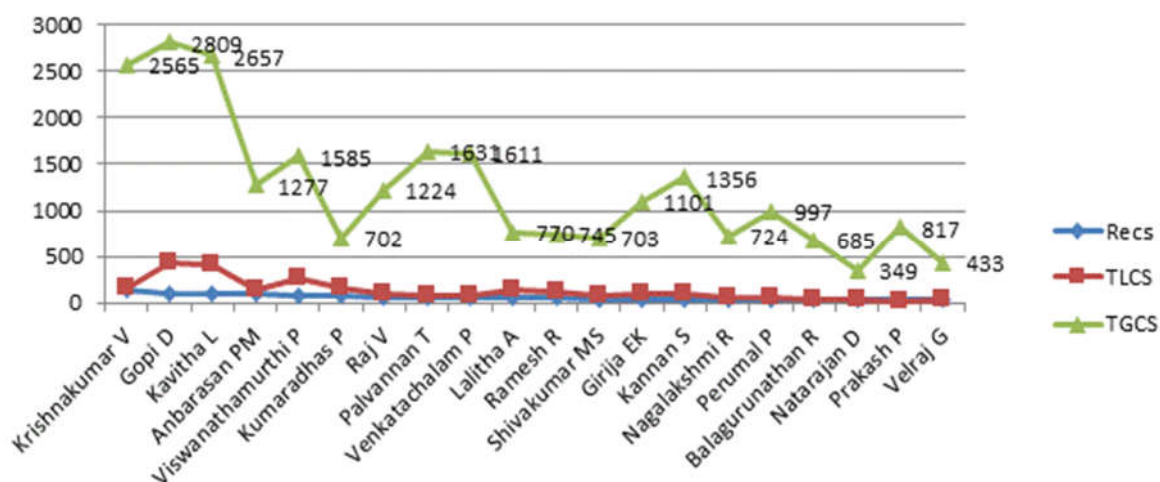

Fig.3. Research productivity of individual authors

Table.6 Journal wise publications of top 20 research output

Sl. No	Author	Recs	%	TLCS	TLCS/t	TGCS	TGCS/t	TLCR
1	Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy	117	6.2	262	21.58	2928	251.72	142
2	Rsc Advances	40	2.1	119	15.3	1003	137.02	113
3	Journal of Materials Science-Materials in Electronics	34	1.8	43	9.07	392	88.18	43
4	Journal of Molecular Structure	31	1.7	30	4.09	282	45.21	53
5	Journal of Cluster Science	28	1.5	36	7.43	280	69.97	85
6	Chemistryselect	25	1.5	73	13.41	293	62.06	56
7	Optik	25	1.5	2	0.19	146	37.23	16
8	International Journal of Biological Macromolecules	19	1.5	20	3.17	380	59.69	13
9	Environmental Science and Pollution Research	18	1.5	22	3.61	390	67.06	26
10	Indian Journal of Geo-Marine Sciences	18	1.5	7	0.84	76	9.9	9
11	Research on Chemical Intermediates	18	1.5	56	8.52	247	42.57	24
12	Asian Journal of Chemistry	17	1.5	0	0	13	1.09	6
13	Materials Letters	17	1.5	30	3.41	350	48.69	9
14	Arabian Journal of Chemistry	16	1.5	16	3.73	381	85.6	23
15	Journal of Biomolecular Structure & Dynamics	16	1.5	24	6.28	370	167.33	53
16	Journal of Raman Spectroscopy	16	1.5	9	0.65	247	18.06	9
17	Journal of Photochemistry and Photobiology B-Biology	15	1.5	37	4.59	421	55.59	28
18	Carbohydrate Polymers	14	1.5	36	4.3	640	92.32	12
19	Materials Research Express	14	1.5	0	0	118	29.83	15
20	Inorganica Chimica Acta	13	1.5	24	2.98	164	24.37	58

Source: Web of Science (WoS)

Table 6 shows the significant journals of publication of scientific research papers. Out of 601 journals, SPECTROCHIMICA ACTA PART A-MOLECULAR AND BIOMOLECULAR SPECTROSCOPY have published the highest number of articles 117(6.2%) with TLCS is 262, and TGCS(Total Global citation Score is 2928. and TLCR IS 142 based on the results, Hence,

The journals dominate by occupying the first rank of research output followed by RSC ADVANCES which has 40 papers(2.1%) and it has placed the second position and JOURNAL OF MATERIALS SCIENCE-MATERIALS IN ELECTRONICS has published 34 papers(1.8%) and it occupies third position.
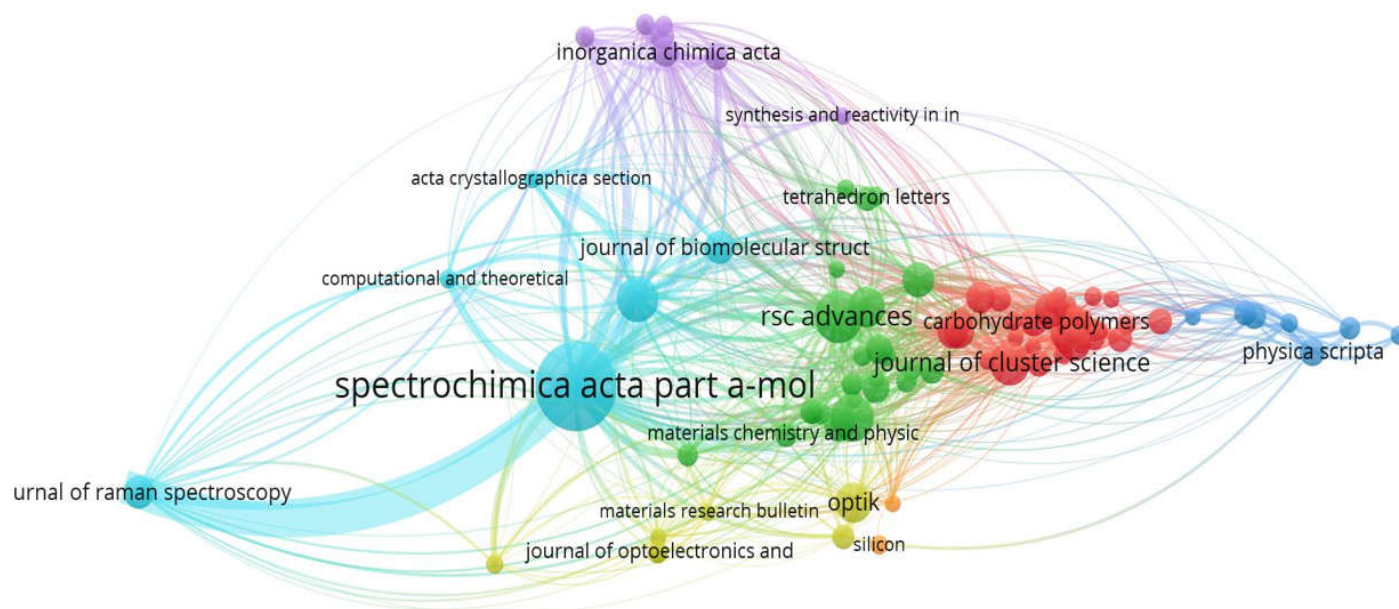

Fig.4. Journals wise distribution of publications (VOS viewer)

Table.7 Collaborative institutions of top 20 research output

Sl. No	Institution	Recs	%	TLCS	TGCS
1	Periyar Univ	1849	98.7	2499	33931
2	Bharathiar Univ	106	5.7	164	2509
3	Anna Univ	61	3.3	62	1413
4	Bharathidasan Univ	52	2.8	26	1008
5	Univ Madras	47	2.5	108	829
6	Natl Inst Technol	46	2.5	50	782
7	Annamalai Univ	44	2.3	31	718
8	King Saud Univ	44	2.3	25	930
9	Abdus Salam Int Ctr Theoret Phys	43	2.3	106	799
10	Chonbuk Natl Univ	42	2.2	65	1465
11	Govt Arts Coll Autonomous	38	2	27	651
12	Alagappa Univ	36	1.9	22	933
13	Manonmaniam Sundaranar Univ	35	1.9	15	441
14	Sri Sarada Coll Women Autonomous	35	1.9	39	628
15	Cent Univ Tamilnadu	25	1.3	59	688
16	SRM Inst Sci & Technol	24	1.3	13	438
17	Chikkanna Govt Arts Coll	23	1.2	5	157
18	KS Rangasamy Coll Arts & Sci Autonomous	22	1.2	29	341
19	Univ San Sebastian	21	1.1	9	273
20	Western Kentucky Univ	21	1.1	23	974

Source: Web of Science (WoS)

Table 7 shows that the top 20 institutions have collaborated with Periyar University during this period of time. A total number of 905 institutions have contributed research papers, out of 905 contributors, among the 905 institutions; Periyar University is in the top position is 1849(98.7%), TLCS is 2499, and TGCS is 33931 followed by Bharathiar University at 106 (5.7%).
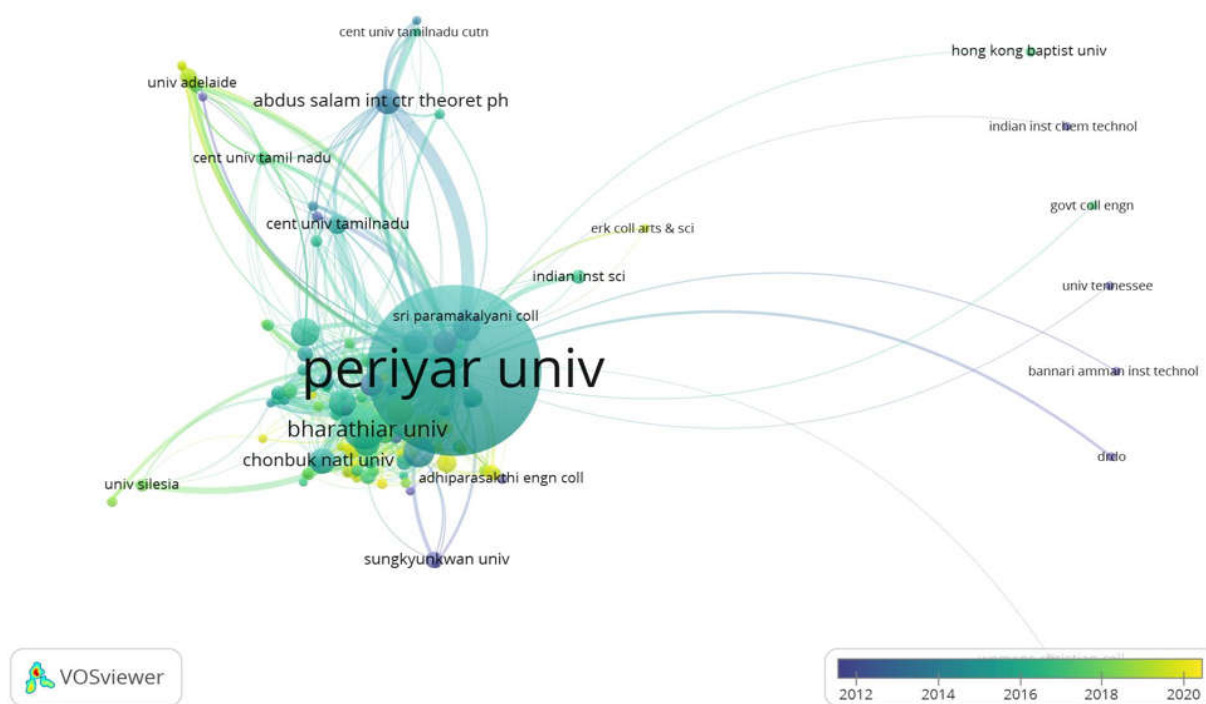
Fig.5. Collaborative institutions of top 20 research output (VOS Viewer)

Table.8 Distribution of keywords in top 20 research output

Sl.No	Country	Recs	%	TLCS	TGCS
1	Synthesis	250	13.3	494	5606
2	Using	189	10.1	251	3915
3	Characterization	166	8.9	283	3090
4	Nanoparticles	165	8.8	286	5447
5	Properties	146	7.8	215	2020
6	Activity	144	7.7	251	3315
7	Applications	120	6.4	222	2309
8	Effect	107	5.7	128	1616
9	Analysis	106	5.7	137	1342
10	Based	104	5.6	195	2444
11	Density	96	5.1	195	1411
12	Molecular	96	5.1	79	899
13	Complexes	91	4.9	232	1413
14	Acid	88	4.7	120	1248
15	Novel	80	4.3	144	1902
16	Optical	79	4.2	84	1096
17	Potential	79	4.2	73	1407
18	Photocatalytic	78	4.2	133	1632
19	Vibrational	78	4.2	98	1415
20	Crystal	77	4.1	78	976

Source: Web of Science (WoS)

Table 8 above shows the keyword distribution of research output. Out of 5363 words, the researcher has considered for research purposes the top 20 words only. For the majority of words 250 Papers(13.3%) with TLCS is 494 and TGCS is 5606 which is placed in the first position of searching the word "SYNTHESIS" followed by USING 189 Papers (10.1%), DENSITY is 96 (5.1 %), MOLECULAR is 96(5.1%) OPTICAL is 79(4.2%) POTENTIAL is 79(4.2%), PHOTOCATALYTIC is 78,(4.2&) VIBRATIONAL is 78(4.2%) respectively.

Table.9 Global country wise distribution of top 20 research output

Sl.No	Country	Recs	%	TLCS	TGCS
1	India	1873	100	2513	34122
2	South Korea	142	7.6	151	3793
3	Peoples R China	95	5.1	58	1566
4	USA	81	4.3	115	2148
5	Saudi Arabia	72	3.8	41	1285
6	Italy	67	3.6	150	1300
7	Malaysia	53	2.8	56	1156
8	Poland	43	2.3	127	1040
9	Japan	36	1.9	72	1076
10	Chile	27	1.4	13	558

11	France	22	1.2	40	326
12	Egypt	20	1.1	43	660
13	Portugal	20	1.1	53	913
14	Germany	18	1	30	335
15	Australia	16	0.9	21	331
16	Spain	16	0.9	13	228
17	Turkey	12	0.6	15	103
18	UK	12	0.6	14	237
19	Russia	11	0.6	7	314
20	Taiwan	11	0.6	2	110

Source: Web of Science (WoS)

Fig.6. Global country wise distribution of top 20 research output (VOS Viewer)
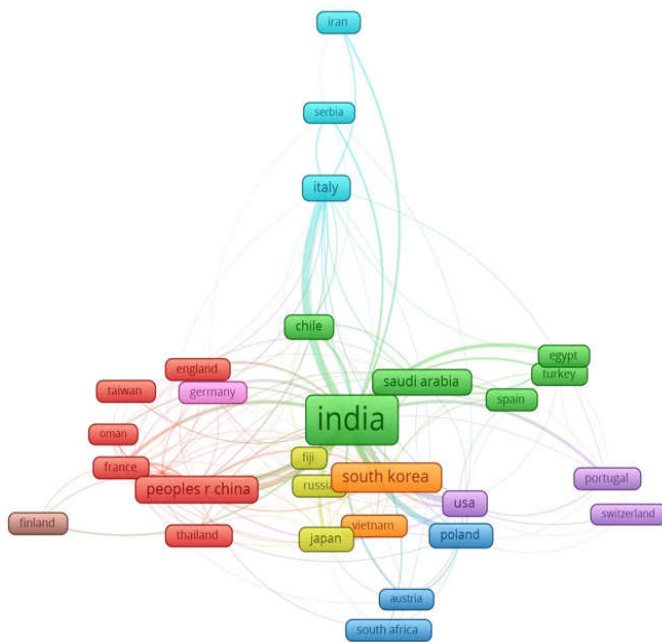
6. Findings and Conclusion

The major findings are drawn based on the analysis done during the period of study. The study focuses the scholarly contributions of the faculty members of Periyar University between 1998 to 2021.

i. It is noteworthy to mention that out of 1868 research papers, the highest number of papers. 252 (13.5%) that placed in first rank in 2020. The highest numbers of local citation score is 369 in 2014 and the highest number of global citation score is 4110 in 2014.

ii. The growth rate of research publication was analyzed by relative growth Rate (RGR) and

Doubling Time (DT) is measured to study the increase in the number of articles and the DT is measured to study the increase in the number of articles and the DT is directly related to RGR. It is the time required for the article to become double the existing amount from 1998 to 2021. RGR was calculated the whole period into one period intervals from 1998 to 2021 (24 years). It observed that the Relative Growth Rate of Publication has steadily decreased from the first to last. The mean doubling time has shown a declining trend.

iii. It is found that the Periyar University faculty members of research output shown an increasing trend and predictable year 2025 and the same trend may also be expected in 2030. Hence; the trend of year wise productivity will be registered as 204.13 growths in 2025 while in 2030 the growth will be predictable more than 246.23 contributions.

iv. Indicates the chronology-wise distribution of research output which were published and indexed in the web of science database from the year 1998 to 2021. The faculty members of Periyar University started to publish their research work in 1868. The study highlights the TLCS, Total local citation score and TGCS, Total global citation score. Out of 1868 research papers. the highest number of papers 252 (13.5%) during the year 2020 impact of Covid-19 periods that are placed in the first rank in 2020. The highest local citation score is 369 in 2014 and the highest global citation score is 4110 in 2014.

v. It is found that the Periyar University faculty members of research output shown an increasing trend and predictable year 2025 and the same trend may also be expected in 2030. Hence; the trend of year wise productivity will be registered as 204.13 growths in 2025 while in 2030 the growth will be predictable more than 246.23 contributions.

vi. It is evident from the above table that out of 1868 articles a majority of 1786 (95.4%) scientific publications was published in scholarly journals. The TLCS is 2465 and TGCS is 31801.

vii. It is commendable to stats the most prolific contributors of scientific articles and found that Dr. Krishna Kumar has got the first position and his total numbers of research publications are 134 He has got 169 in TLCS, 2565 in TGCS, 124 in TLCR and 69 in TLCSb.

viii. It is identified from the study that highest journals SPECTROCHIMICA ACTA PART A-MOLECULAR AND BIOMOLECULAR SPECTROSCOPY has published the highest number of article 117(6.2%) with TLCS is 262, and TGCS(Total Global citation Score is 2928, and TLCR IS 142 based on the results.

ix. A total number of 905 institutions have contributed research papers, out of 905 contributors, among the 905 institutions; Periyar University is in the top position is 1849 (98.7%), TLCS is 2499, and TGCS is 33931 followed by Bharathiar University 106 (5.7%).

x. The majority of words 250 Papers (13.3%) with TLCS is 494 and TGCS is 5606 which is placed in the first position of searching the word "SYNTHESIS" followed by USING 189 Papers (10.1%), DENSITY is 96 (5.1%), MOLECULAR is 96(5.1%) OPTICAL is 79(4.2%) POTENTIAL is 79 (4.2%), PHOTOCATALYTIC is 78 (4.2%) VIBRATIONAL is 78 (4.2%) respectively.

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