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ORIGINAL ARTICLE

Testing of Bradford Law through Identification of Core Journals of Faculty members at Periyar University: A Scientometric Profile

Chandran Velmurugan

Researcher, Department of Library and Information Science, Periyar University, Salem, Tamil Nadu 636011, India.

Abstract

This study is based on the scholarly communications of faculty members at Periyar University as reflected in Social Science Citation Index (SSCI), Science Citation Index (SCI), and Arts and Humanities Citation Index (A & HCI). This paper aims to ascertain the growth and development of scholarly publications published by faculty members from Periyar University as reflected in Web of Science citation database and found a total 703 scientific publications contributed in seven document types in the website. As a whole, the most of the document was peer viewed scholarly journal articles (684), which involved 97.29 per cent and the TLCS was 612 and TGCS was 4469 of the total publications. The other sources are includes review (6; 0.85 per cent), meeting abstract (5; 0.72 per cent), correction (3; 0.43 per cent), Letters (3; 0.43 per cent), proceedings papers (1; 0.14 per cent), editorial materials (1; 0.14 per cent). Even though, the original peer reviewed articles were still significant and focuses the scientometric analysis, but counting the proceedings papers and other source types as well. To evaluate the literature output, the scientometric indicators such as EGR, CAI, RCI etc. have used and Bradford law of scattering used to test the relationship between the zones.

Keywords: Faculty publications; Scientometrics; PU; scattering of journals; Research trend; Bradford law; WOS.

Introduction

Scientometric analysis is one of the metrics study and growing rapidly in recent years in the field of Library and Information Science. Initially, the term scientometrics is based on the bibliometric analysis and it is associated with other metrics such as Informetrics, webometrics, cybermetrics, and recently altmetrics. The word scientometrics is well-known in the journal Scientometrics when appeared in the year 1978 (Garfield (2007). According to Tague-Sutcliffe (1992), scientometrics is the study of quantitative aspects of science as a discipline or economic activity whereas Van Raan (1997) says that scientometric research is quantitative study for science and technology for the growth and development of science and technology. Macias-Chapula describes the term scientometric study is very essential for science community to determine the state-of-the-art of a given topic (quoted by Lois et al., 2009). In this context, scientific literature output of faculty members from Periyar University has been taken for analysis.

Periyar University (shortly called as PU) started in 1997 by Government of Tamilnadu with aims at developing knowledge in various fields to realize the maxim inscribed in the logo wisdom maketh world which means 'Arival Vilayum Ulagu'. The university is named after the Great Social Reformer E.V. Ramasamy affectionately called

Address for correspondence
Chandran Velmurugan, Researcher, Department of Library and Information Science, Periyar University, Salem, Tamil Nadu 636011, India.
E-mail: murugan73@gmail.com
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'Thanthai Periyar'. Periyar University accredited with 'A' Grade by National Assessment and Accreditation Council (NAAC) recently which is located at Salem, Tamilnadu. The University central library of this university houses more than 75,000 books and 3000 back volumes of journals and 2800 dissertations. The UGC-INFONET digital library provides various e-resources and makes the learning process 24/7. Periyar University has an exclusive computer center which takes care of web development. The network connectivity in the campus has lent a competitive edge to students, teachers and researchers in their academic and research pursuits. The purpose of the present study is to examine the followings:

- Growth rate of literature
- Authorship pattern and APPA and ACPP
- Most prolific journals and articles
- Identification of core journals
- Bradford Law on core journals
- Most prolific contributors
- Collaborative research trends on publications

Related work

Researcher identified the relevant research area and the documents were correctly matched to the objectives and variables of the present study. However, numbers of research have already been done in the same work and few of them have been taken for the present study. Alghanim and Alhamali (2011) reported a ScientometrIc study on research productivity among faculty members at medical and health schools in Saudi Arabia in the Saudi Medical Journal, the comparative study indicated the University research funding and publication performance in Minerva and Research Policy (Geuna & Martin (2003), (Auranen & Nieminen (2010). Ho (1998) analyzed the research output among the three faculties of business, education, humanities & social sciences in six Hong Kong universities in the journal Higher Education, He; Geng & Campbell-Hunt (2009) examined the research collaboration and research output among 65 biomedical scientists in a New Zealand University in Research Policy. Swain et al. (2013) have carried out the study on faculty publications of KIIT University in India. Total number of 361 scholarly articles which are indexed in Scopus was collected between 2000 and 2013. The articles evaluated in terms of authorship pattern, ranking of authors, highly cited papers, degree of collaboration, year wise distribution, domain wise distribution. The finding of the study shows that the majority of scholarly communications have contributed by three authors and the collaborative research trends is predominant. Gautam, and Rajani Mishra (2015) have reported the literature output of Banaras Hindu University in the journal DESIDOC Journal of Library & Information Technology. The study revealed that Banaras Hindu University publication was increased trend during the study period and most of the scientists were contributed by joint authors as the collaborative trend was also increased. Velmurugan and Radhakrishnan (2015) identified through the literature output of Amylase in Microbiology published by Indian Scientists during 2010-2014. The results show that 26.17% of papers were the highest proportion during 2012 and the lowest amount was 14.97% in 2011. The majority of (92.53%) scientific papers were journal articles and almost 96.40% of articles were published by Indian authors and the remaining 4 (3.60%) papers were contributed by England and South Korea. The study carried out by Velmurugan (2013) to examine the scholarly publications in Annals of Library and Information Studies with 203 contributions published in the journal for a period of selected six years from 2007 to 2012. Velmurugan (2014) conducted bibliometric analysis with special reference to authorship pattern and collaborative research work of Journal of Intellectual Property Rights (JIPR) for selected six years during 2007-2012. The results of the study were found that the highest numbers of contributions 56 were published in the years 2012. The degree of collaboration in this journal is 0.34. Further, the same author (Velmurugan, 2014) investigated with 546 contributions published in the Indian Journal of Pure and Applied Physics (IJPAP) selected four years between 2009 and 2012. The findings of the results revealed that the maximum numbers of contributions 149 were published in the year 2012 whereas the minimum numbers of 121 were published in the year 2011. The highest numbers of author productivity 420 were published in the year 2010. Moreover, the same work has been used in various universities in different topics and few of the university research have been taken into consideration for the present study such as medical and health schools in Saudi Arabia (2011), biomedical research in Lebanon and the United Arab Emirates during 1988-2007 (2009), research collaboration in New Zealand University (2009), Hong Kong universities (1998), Institute of Molecular and Cell Biology (2003).

In this paper has made an attempt to observe the contributions to literature output published by

faculty members of Periyar University with special reference to identification of core journals testing by Bradford Law whether the law is fit or not during the study period of particular journals.

Materials and Method

To achieve the objective of the study, we retrieved research output of Periyar University in the area of science and technology from Web of Science (WOS) Core Collection online database which is provided by Thompson Scientific Inc., Philadelphia, USA. The scientometric research work was performed on 6th May 2015. The refinement process in web of science has been provided below:

Select option: Web of Science Core Collection

Searched for: Periyar Univ*

Topic given: Address

Time span set: 1998- 2014

A total number of 703 articles were gathered from the faculty members for the period from 1998 to 2014. As the database has provision to export only 500 documents at a time the downloaded records were saved in various names in one folder and analyzed using HistCite Software developed by Garfield. The HistCite is a visualization and analytical tool which assists to scientists and researchers to examine the significant work on a particular topic and notice the growth rate. It also helps to identify highly cited articles as well as authors, highly productive journals as well impact journals, most important scholarly articles, and highly cited references, and predominant institutions and organizations. In HistCite, we made the graphical map of the historiography to know the historical development of research based on the research productivity in particular domain or all domains in science filed as reflected via web of science. In this context, the collected data was imported to excel for further analysis with suitable statistical tools. To determine the literature output published by the faculty members of Periyar University, the present study has been used the following scientometric indicators.

Scientometric indices used

To measure research output the following scientometric indices have used as techniques such as:

- Exponential growth rate (EGR),
- Co-Authorship Index (CAI),
- Relative Citation Impact (RCI) and
- Bradford law of scattering.

1. Exponential growth rate

The formula for measuring the exponential growth is given below:

$$N_{(t)} = N_{(0)}\, e^{rt}$$

Where,

$N_{(t)}$ - represents the population when the time elapsed is't' years, $N_{(0)}$ – represents the initial population, 'r'- represents the growth rate,'t'- represents the number of years and 'e' – represents the natural base of logarithms whose value is 2.711828.

2. Co-Authorship Index (CAI)

A number of scientometric indicators are used for measuring the co-authorship pattern. Here, in this study we have used Co-Authorship Index (CAI) formulated by Garg and Pathi (2001), to study the pattern of author collaboration. CAI is calculated using their formula is given below:

$$CAI = \frac{Nij\,/\,Nio}{Noj\,/\,Noo} \times 100$$

Here, N_{ij} - Number of papers having j authors in particular period/year, N_{io} - Total output of particular period/year, N_{oj} - Number of papers having j authors in all the periods/year and $N_{oo.}$ Total Number of papers by all authors in all the periods/years.

In which, CAI = 100 reflects that the number of publications corresponds in the world average, CAI >100 reflects higher than the world average and CAI < 100 reflects lower than the world average within a co-authorship pattern.

3. Relative Citation Impact (RCI)

Relative Citations Impact (RCI) is used to measure the citations impact of the scientific publications by a country compare with world average output. According to Gupta and Dhawan (2006), it is determined based on the average citations per paper (CPP) for the relative to the average citations per paper for the world research output. The formula RCI is given below:

$$Relative\ Citations\ Impact = \frac{Average\ Citation\ Per\ Paper\ for\ the\ Country\ Output}{Average\ Citation\ Per\ Paper\ for\ the\ World\ Output}$$

The RCI compares a country's rate (the citation per year) for a specific filed to the world wide citation rate for that field. A Relative Citation Impact greater than 1 shows that the country's rate for the field is higher than the world's and is viewed by some as a reliable indicators of the quality of the average paper. This latter measure takes into account the size of the particular country productiveness relative to that in other countries (National Research Council, 2000).

4. Bradford law of scattering

Samuel Clement Bradford introduced the Bradford's law of scattering in the 1934. The Bradford's law is to explain that a group of journals could be arranged in an order of decreasing productivity and revealed that journals which yield the most productive articles are coming first and the most unproductive in the last. According to this law, the journals are to be grouped into a number of zones each producing a similar number of articles. However, the number of journals in each zone will be increasing rapidly. Then the relationship between the zones is 1: n: n2.

For describing the scattering phenomena, the following formula has been adopted by the researchers.

$$F(X) = a + b \log x$$

Where F(X) – is the cumulative number of references as contained in the first-x most productive journal and 'a' and 'b' are constants. Total number of journals for this present study is 297.

Analysis

Using the methodology and scientometric indices as stated above, a total of 703 publications with 4469 citations were retrieved during the period. It is observed from the Table 1 (ch.1) indicates the year wise growth rate and change in the number of whole documents. The maximum number of growth rate is 18.0 in the year 2007 and followed by the next growth rate 2.75 in the year 2007. The average growth rate is 41.1 over all study period.

It is inferred in the above Table 1 (chart 1) indicates that the growth rate in research articles as well in authors over the period of study. In this connection, the majority of research papers are 148 (21.05%) published by the faculty members of different departments in the year 2014. The next productive year is 2013 by publishing 107 records (15.22%). The smallest number of publications is i.e. one article in the years 1998 and 2007 respectively.

Table 1: Growth Rate of Literature

S. No	Years	TP	TA	AAPP	APPA	TC	ACPP	EGR
1	1998	1	2	2.0	0.5	-	-	-
2	1999	4	7	1.75	0.57	29	7.25	4.0
3	2000	2	4	2.0	0.5	4	2.0	0.5
4	2001	10	19	19.0	0.53	47	4.7	5.0
5	2002	3	5	1.67	0.6	1	0.33	0.3
6	2003	2	6	3.0	0.33	5	2.5	0.6
7	2004	1	3	3.0	0.33	3	3.0	0.5
8	2005	18	53	2.94	0.34	345	19.17	18.0
9	2006	12	35	2.92	0.34	221	18.42	0.66
10	2007	33	110	3.33	0.3	190	5.76	2.75
11	2008	47	169	3.60	0.28	559	11.89	1.42
12	2009	67	245	3.66	0.27	719	10.73	1.43
13	2010	81	298	3.68	0.27	799	9.86	1.21
14	2011	70	276	3.94	0.25	502	7.17	0.86
15	2012	97	367	3.78	0.26	500	5.16	1.39
16	2013	107	456	4.26	0.23	331	3.09	1.1
17	2014	148	557	3.76	0.266	214	1.45	1.38
Total		703	2612	3.72	0.27	4469	6.36	41.1

TP: Total papers, TA:Total authors, AAPP: Average Authors per paper, APPA:Average Productivity per author, TC:Total citations, Average citation per paper, EGR: Exponential growth rate.

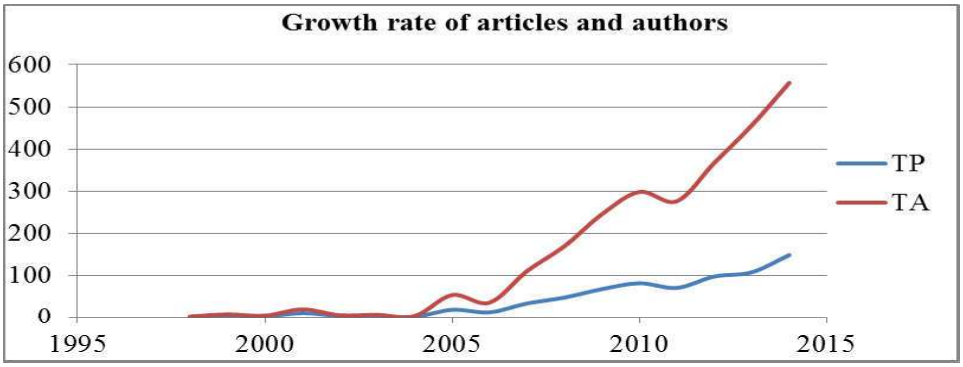


Chart 1: Growth rate of articles and authors

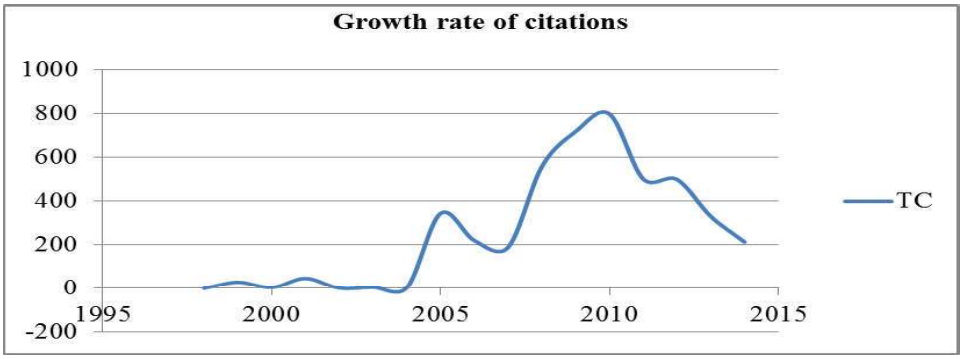


Chart 2: Growth rate of citations

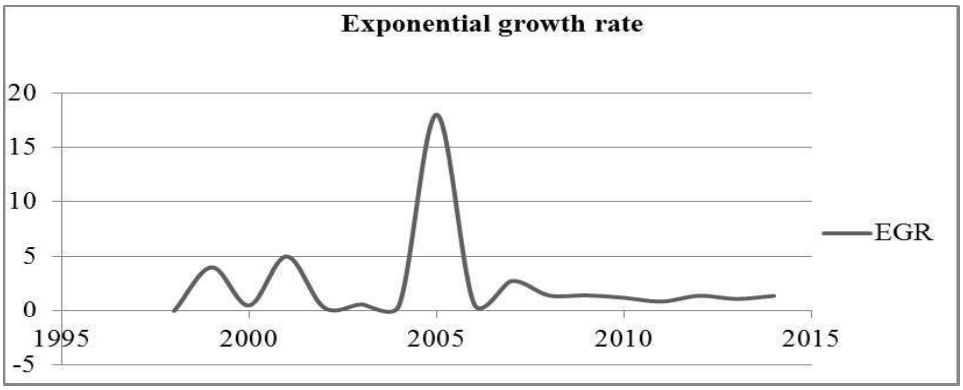


Chart 3: Exponential growth rate

Base on the study and the chart curve the growth rate in articles and also in authors interest has shown the increasing trend from the year 2005 onwards.

It can be found from the chart 2 represents that the analysis associated with citation of scholarly communications from PU and identified the entire average number of citations per paper i.e. 6.36 and the majority of citations per paper (19.17) in the year 2005 and placed the first rank followed by (18.42) in the year 2006 and the least number of citations (0.33) in the year 2002 and also found that there is no citation in the year 1989.

The table 1 represents the exponential growth rate of over all publications from faculty members of Periyar University during seventeen years from 1998 to 2014. The highest growth rate (2.75 %) was found during the year 2007 with 33 publications and it is noticed that this particular year's research articles has fairly increased and the lowest growth rate were in the year 2000, 2002- 2004, 2006 and 2011. After 2007, the growth rates of productivity levels are more or less same and there is no significant difference.

Identification of core journals

The prolific core journals are found in the publication research as the Journals are the vital instrument and role in academic performance in schools, college and university education all over the world. In this present study, it is inferred from the Table 2 that the rank based highly prolific journals are measures based on the literature outputs retrieved from the web of science database. The analysis shows that out of 297 journals, the 'Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy' is the highest number of 98 articles (13.9 percent) and has occupied first rank along with 19 highest h-index, followed by 'Asian Journal of Chemistry' is in the second place with 17 records and the h-index is 8, the next the Journal of Raman Spectroscopy has taken the third position with 16 records and h-index is 6. The least rank has placed by 181 journal articles in each one records.

Table 3 represents that the journal distribution of research by production of faculty members of Periyar University. The Bradford's law of scattering was introduced by Samuel Clement Bradford (1934) and pointed out that if scientific journals are arranged in order to decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particular devoted to the subject and several groups and zones contain the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be $1:n:n^2$.

Through the Table 3 and Graph 1 has been plotted with value of R^2= 0.874 and also indicated the log value equation y= 2.008ln(x) - 0.816 to determine the cumulative value of scholarly journals.

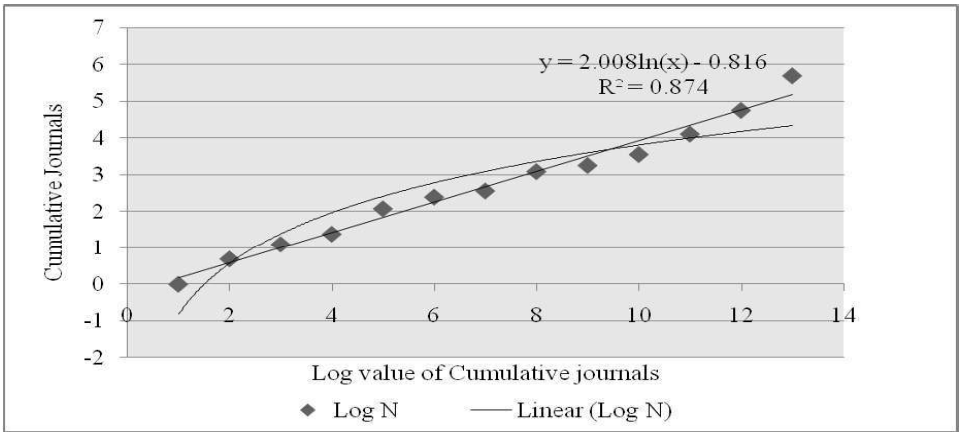
Table 2: Top Ranking journals in PU

#	Journal	Recs	Rank	h-index
1	Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy	98 (13.9)	1	19
2	Asian Journal of Chemistry	17 (2.4)	2	8
3	Journal of Raman Spectroscopy	16 (2.3)	3	6
4	Physica Scripta	12 (1.7)	4	6
5	E-Journal of Chemistry	10 (1.4)	5	4
6	Journal of Molecular Structure	10 (1.4)	5	4
7	Materials Letters	10 (1.4)	5	4
8	Optik	10 (1.4)	5	1
9	Computers & Mathematics with Applications	9 (1.3)	6	6
10	Indian Journal of Pure & Applied Mathematics	9 (1.3)	6	1
11	Rsc Advances	9 (1.3)	6	3
12	Carbohydrate Polymers	7 (1.0)	7	5
13	Journal of Applied Electrochemistry	7 (1.0)	7	6
14	Bulletin of Materials Science	6 (0.9)	8	2
15	Chinese Physics B	6 (0.9)	8	2
16	Computational and Theoretical Chemistry	6 (0.9)	8	2
17	Indian Journal of Geo-Marine Sciences	6 (0.9)	8	1
18	Journal of Coordination Chemistry	6 (0.9)	8	3
19	Journal of Environmental Biology	6 (0.9)	8	1
20	Journal of Optoelectronics and Advanced Materials	6 (0.9)	8	2
21	Materials Chemistry and Physics	6 (0.9)	8	4
22	Physica B-Condensed Matter	6 (0.9)	8	4
23	Journal of Hazardous Materials	5 (0.7)	9	3
24	Journal of Photochemistry and Photobiology B-Biology	5 (0.7)	9	4
25	Journal of The Geological Society of India	5 (0.7)	9	2

Table 3: Bradford's Law of Scattering in scientific journals of PU

Rank	NJ	CJ	NA	TA	CA	Log N	PCA	PCJ
1	1	1	98	98	98	0.000	13.94	0.34
2	1	2	17	17	115	0.693	16.36	0.67
3	1	3	16	16	131	1.099	18.64	1.01
4	1	4	12	12	143	1.386	20.34	1.35
5	4	8	10	40	183	2.079	26.03	2.69
6	3	11	9	27	210	2.398	29.87	3.70
7	2	13	7	14	224	2.565	31.86	4.37
8	9	22	6	54	278	3.091	39.55	7.41
9	4	26	5	20	298	3.258	42.39	8.75
10	9	35	4	36	334	3.555	47.51	11.78
11	26	61	3	78	412	4.111	58.61	20.54
12	55	116	2	110	522	4.753	74.25	39.06
13	181	297	1	181	703	5.694	100	100

NJ: No of journals, CJ: Cumulative journal, NA: No of articles, TA: Total article, CA: Cumulative articles, PCA: Percentage of Cumulative articles, PCJ: Percentage of Cumulative journals



Graph 1: Log value of cumulative journals

Table 4: Zone wise distribution

Zone	Journals	Journal percent	Articles	Article percent	Multiplier
1	11	3.71	210	29.87	-
2	50	16.84	202	28.73	4.55
3	236	79.46	291	41.39	4.72
Total	297	100	703	100	(mv)*

*Mean value

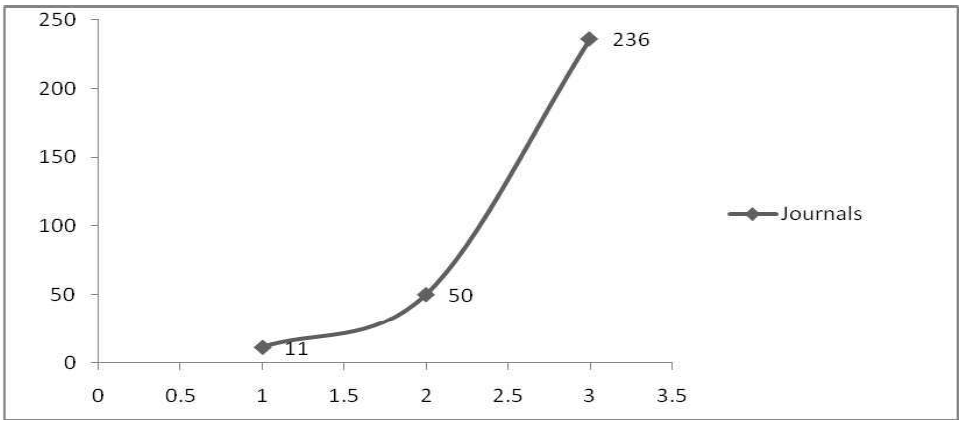


Chart 4: Bradford's Law of Scattering

Table 4 (chart 4) indicates that the distribution of scholarly journals and contribution of articles in the three zones. According to Bradford, the zones, indicated will form an approximately geometric series in the form 1: n: n2. But, it is identified that the relationship of each zone in the present study is 11:50:236. The ratio shows that it does not fit into the Bradford's law of distribution. It is noticed that the distribution of core journals were published by a few number of journals. Here, 11 refer to the number of journals in the Nucleus and the mean Bradford multiplier is 4.635.

Hence, expression can be given as:

$11:11x\ (4.635):11x\ (4.635)^2::1:n:n^2$

11:5.0985:236.315>252.414

$$\%\ error = \frac{252.414 - 297}{297}\ x100 = -15.012$$

It is therefore, very clear that the percentage of error is in negative and therefore, the data does not fit in Bradford's law.

The pattern of authorship has been evaluated by the researchers to estimate the percentage of single vs. multiple authors. Authorship pattern of the research outputs is represented in the below Table 5 and the study shows that of the total 2612 authors have contributed 703 scholarly articles in different frequencies of authors. Among 703 research papers, only 5 (0.71%) articles were published by single author, and followed by 166 (23.61%) papers were written by two authors, 218 (31.0%) articles were produced by three authors, 130 (18.49%) papers were published by four authors. It can be examined that three authors were predominant compare with others. The majority number of research articles i.e. 698 (99.29%) were written by multi-authors and the minimum number of articles i.e. 5 (0.71%) were published by single authors. The authorship pattern depicts a significant difference between the single author and multi authors and found that the very least number of papers were produced by single authors. The study viewed that more than 99% of the contribution have come from two, three, four and five authors which is actually positive trend in collaboration during the period of study.

It can be observed from the Table 6 and the analysis of the co-authorship pattern in scientific research articles produced by the faculty of PU, the study period has been divided into three block period i.e. 1998-2003, 204-2009 and 2010-2014. The study reveals that there are only 5 single author articles, CAI falls between third block (55) and first block

Table 5: Authorship pattern

S. No	NA	NP	TA	% of Papers	% of Authors	% of CP
1	Single authors	5	5	0.71	0.19	0.71
2	Two authors	166	332	23.61	12.72	24.32
3	Three authors	218	654	31.00	25.05	55.32
4	Four authors	130	520	18.49	19.91	73.81
5	Five authors	95	475	13.52	18.18	87.33
6	Six authors	44	264	6.26	10.11	93.59
7	Seven authors	19	133	2.71	5.09	96.3
8	Eight authors	14	112	1.99	4.28	98.29
9	Nine authors	7	63	0.99	2.41	99.28
10	Ten authors	2	20	0.29	0.76	99.57
11	Eleven authors	2	22	0.29	0.84	99.86
12	Twelve authors	1	12	0.14	0.46	100
	Total	703	2612	100	100	

NA- No of authors, NP- No of papers, TA- Total authors, CP- cumulative papers

Table 6: Analysis of Co-Authorship Index (CAI) in PU

Block Years	Authors						Total
	Single	Two	Three	Four	Five	>Five	
1998 - 2003	1(66)	16 (309)	5(7)	0 (0)	0 (0)	0 (0)	22
2004 - 2009	2(160)	51(122)	66 (120)	29 (88)	25 (76)	5 (40)	178
2010 - 2014	2(55)	99 (81)	147 (93)	101 (108)	109 (112)	45 (125)	503
Total	5	166	218	130	134	50	703
	CAI indicates( )						

(66). But in case of two author records 166 articles have been produced, whose CAI falls between third block (81) and first block (309). Followed by three author articles, CAI falls between first block (7) and third block (93). CAI for four authored articles falls between first block (0) and third block (108). The next CAI for five authored articles falls between first block (0) and the third block (109) and more than five authored articles falls between first block (0) and the third block (125). Hence, it is observed that single author articles are less in number, with regard to research on scholarly articles of PU.

Performance of Top 10 Countries

The research papers produced by the Scientists from Periyar University have collaborated with 32 countries for the period of study. It is reported from the analysis that the highest quantity of 48 peer-reviewed scholarly articles of this university have published in association with researchers of South Korea, and followed by Italy (36 papers), USA (16 papers), Poland (15 papers), Germany (13 papers), Saudi Arabia (11 papers), Portugal (9 papers), Japan (8 papers), Malaysia (7 papers), Spain and Egypt (6 papers each), Hungary and Finland (5 papers each), Serbia, People R China and England (4 papers each), Switzerland, Singapore, Iran, France and Chile (3 papers each), Cameroon, Austria and Algeria (2 papers) and the least one paper each published by Vietnam, Turkey, Taiwan, Slovakia, Scotland, Oman, Macedonia, Iraq and Canada respectively. The same work has already done in the recent time by Uddin et al; Fayand and Gautrias and Ivanovic; Fu and Ho (2015).

The relative citation impact has measured in the above table and identified the highest number of RCI apart from India, South Korea has in the top list and occupied the first place i.e. 0.1636 and followed by Japan is in the second highest position and other countries RCI is presented in the Table 7.

Findings

Based on the study a few significant findings are listed here:

1. It was identified that the relationship of each zone in the present study is 13:22:262. The ratio shows that it does not fit into the Bradford's law of distribution. It is noticed that the distribution of core journals were published by a few number of journals.
2. It was found that the highest position in terms of contribution of research papers in the top list which is First Rank is Krishna kumar, V with 111 research papers. The second rank is occupied by Gopi, D and Kavitha, I with 75 papers each followed by Viswanathamurthi, P has got the third position with 43 papers and fourth position has got by Anbarasan.
3. It was noteworthy that out of the total 703 scholarly articles published, 99.29 percent of them are published under collaborative venture of publication among the faculty members in their research. It is noticed that in the beginning (1998) there was no significant study after that the collaborative value has been increased between 0.75 and 0.99.
4. It was identified collaborative links with other institutions and based on that the most number of 48 peer-reviewed research papers of this university have been published in association with researchers of South Korea, and followed by Italy (36 papers), USA (16 papers) and the least one paper each published by Vietnam, Turkey, Taiwan, Slovakia, Scotland, Oman, Macedonia, Iraq and Canada respectively.

To conclude, university administration in developing countries is accountable for initiating and creating a culture that appreciates research activity and understands the parameters and indicators such as citations. Authors of highly cited research outputs

Table 7: Performance of Top 10 Countries

S. No	Country	Recs	%	Total Citations	ACPP	RCI
1	India	703	75.83	4469	6.36	0.1084
2	South Korea	48	5.17	461	9.60	0.1636
3	Italy	36	3.88	196	5.44	0.0927
4	USA	16	1.72	115	7.19	0.1225
5	Poland	15	1.62	111	7.40	0.1261
6	Germany	13	1.44	58	4.46	0.0759
7	Saudi Arabia	11	1.19	27	2.45	0.0417
8	Portugal	9	0.99	59	6.56	0.1118
9	Japan	8	0.89	67	8.37	0.1426
10	Malaysia	7	0.76	6	0.86	0.0147
	Total	866		5569	58.69	

are those who created an impact on their research fields and are supposed to be influential on their student's future career (Sweileh et al., 2014).

References

1. Alghanim S.A., & Alhamali R.M. Research productivity among faculty members at medical and health schools in Saudi Arabia. Saudi Medical Journal, 2011;32:1297-1303.
2. Bissar-Tadmouri N. & Tadmouri G.O. Bibliometric analyses of biomedical research outputs in Lebanon and the United Arab Emirates (1988-2007). Saudi Medical Journal, 2009;30:130-39.
3. Fayand, Ste´phane and Gautrias, Se´bastien. A scientometric study of general relativity and quantum cosmology from 2000 to 2012, Scientometrics, 2015;105:471–484, DOI 10.1007/s11192-015-1674-7.
4. Garfield E. The Science of Science to Scientometrics: Visualizing the history of science with HistCite Software. Presented at 11th ISSI International Conference, Madrid, 2007 June 25. Retrieved from: http://www.garfield.library.upenn.edn/papers/issispain2007.pdf.
5. Gautam, VK and Rajani Mishra. Scholarly Research Trend of Banaras Hindu University During 2004-2013: A Scientometric Study Based on Indian Citation Index, DESIDOC Journal of Library & Information Technology, 2015;35(2):75-81.
6. He Z.-L., Geng X.S., & Campbell-Hunt C. Research collaboration and research output: A longitudinal study of 65 biomedical scientists in a New Zealand University. Research Policy, 2009;38:306-17. doi:10.1016/j.respol.2008.11.011.
7. Ho K.K. Research output among the three faculties of business, education, humanities & social sciences in six Hong Kong universities. Higher Education, 1998;36:195-208. doi:10.1023/A:1003272819743.
8. Ivanovic Dragan Fu, Hui-Zhen and Ho Yuh-Shan. Publications from Serbia in the Science Citation Index Expanded: a bibliometric analysis, Scientometrics 2015;105:145–60, DOI 10.1007/s11192-015-1664-9.
9. Lee C.K. A ScientometrIc study of the research performance of the Institute of Molecular and Cell Biology in Singapore, Scientometrics, 2003;13(5):95-110.
10. Lolis S.F et al. Scientometric analysis of energetic ecology: Primary production of aquatic macrophytes. Maringa, 2009;31(4):363-69.
11. Phillimore A. University research performance indicators in practice: The University Grants Committee's evaluation of British universities, 1985-86, Research Policy, 1989;18(5):255-71.
12. Swain Dillip K.; Rautaray Dr. Bijayalaxmi; and Swain, Dr. Chandrakanta. Scientometric Dimension of Research Productivity of a Leading Private University in India. Library Philosophy and Practice (e-journal). 2013.p.933. http://digitalcommons.unl.edu/libphilprac/933.
13. Sweileh et al. Assessing the Scientific Research Productivity of the Palestinian Higher Education Institutions: A Case Study at An-Najah National University, Palestine. SAGE Open July-September 2014:1–11, DOI: 10.1177/2158244014544287 http://www.uk.sagepub.com/aboutus/openaccess.htm.
14. Subramanyam, K. Bibliometric studies of research collaboration: a review. Journal of Information Science, 1983;6:35-37.
15. Tague-Sutcliffe J.M. An introduction to Informetrics. Information Processing & Management, 1992;28:1-3.
16. Uddin et al. Scientometric mapping of computer science research in Mexico, Scientometrics, 2015;105:97–114, DOI 10.1007/s11192-015-1654-y.
17. Van Raan AFJ. Scientometrics: State-of-the-art. Scientometrics, 1997;38:205-18.
18. Velmurugan C and Radhakrishnan N. Literature output of Plagiarism: a Scientometric approach through Web of Science, Combating Plagiarism: a new role for Librarian edited by Manaswini Patra and Sudhir Kumar Jena, S.K. Book Agency, New Delhi, 2015.p.78-88.
19. Velmurugan C and Radhakrishnan N. Research Productivity of Amylase in Microbiology in Indian Perspective: a Scientometric analysis, Microbial Production of Amylase in Bacillus Cereus Sp, Edited by Manimaran, D, Velmurugan, C and Elangovan, N, Dr, Germany, LAMBERT Academic Publishing (LAP), 2015.p.128-43.
20. Velmurugan C. Scientometric Analysis: Annals of Library and Information Studies Publications Output During 2007–2012, International Journal of Library and Information Studies, 2013;3(3):58-65.
21. Velmurugan C. Authorship Pattern and Collaborative Research Output of Indian Journal of Pure and Applied Physics (IJPAP), International Journal of Art & Humanity Science (IJAHS), 2014;1 (2):37-41.
22. Velmurugan C. Research Output with Special Reference to Authorship Pattern and Collaborative Research Work of the Journal of Intellectual Property Rights (JIPR) During 2007-2012, Journal of Information Technology and Library Science, 2014;2(1):1-8.