Research Publication Trends among Faculty of Bharathidasan University: A Scientometric Study

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Abstract: Bibliographic records of 2982 items retrieved from Web of Science were studied and increasing publication trends were seen in Bharathidasan University (BDU). The average output of the organization was 87 publications per year; the peak was 269 items in 2013 and the minimum was only one item in the year1981. It was seen that the publications of Bharathidasan University received a total of 4763 citations during the period of 14 years. The average citation per item was 5.7.

Keywords: Bibliometrics, Scientometrics, Collaboration Pattern, Publication Density

1.0 Introduction

Metrics studies have an important role in understanding the growth of a discipline and assist in designing national policies for implementation and improving the research level of their institutions/organizations. Most of the metrics studies use online databases for retrieving published literature for the analysis. Scientometrics is the science of measuring and analyzing science research. In practice, scientometrics is often done using bibliometrics, which is a measurement of the impact of (scientific) publications. Similar scientific fields are Bibliometrics, Informetrics, Webometrics, Virtual ethnography and Web mining. This study is an attempt made to analyze the research output of Bharathidasan University towards international science using different metrics.

2.0 Objective of the Study

- To find out the year wise distributions of authorship pattern
- To find out the Author Productivity
- To identity the Country wise distribution of publications
- To identify the degree of Collaboration
- Mapping of highly cited papers

3.0 Methodology

For our study data were downloaded from Web of Science database. Here we have used the search techniques to download the data. First we enter the database and we type "Bharathidasan University" in the address field, study period chosen for this study is 34 years that is from (1981-2014). Vosviewer open source software is used for the mapping of the analyzed data.

4.0 Analysis

Following tables represent the quantitative performance of Bharathidasan University towards international science through different metrics

4.1 Year wise distribution of publications

The distribution of 2982 items by publication year revealed rising publication trend only after 2002. The average output of the organization was 87 publications per year; the peak was 269 items in 2013 and the minimum was 1 item in the year 1981.

Table 1 shows the Year wise Distribution of Publications

S.No	Year	Recs	Cum	Rec %	Cum %	TLCS	TGCS
1	1981	1	1	0.03	0.03	0	0
2	1982	6	7	0.20	0.23	5	14
3	1983	19	26	0.64	0.87	32	97
4	1984	13	39	0.44	1.31	25	138
5	1985	14	53	0.47	1.78	28	144
6	1986	29	82	0.97	2.75	38	292
7	1987	27	109	0.91	3.66	19	107
8	1988	28	137	0.94	4.59	20	166
9	1989	21	158	0.70	5.30	12	65
10	1990	19	177	0.64	5.94	28	208
11	1991	22	199	0.74	6.67	58	227
12	1992	33	232	1.11	7.78	116	460
13	1993	29	261	0.97	8.75	105	605
14	1994	46	307	1.54	10.30	169	936
15	1995	42	349	1.41	11.70	162	873
16	1996	57	406	1.91	13.62	148	624
17	1997	65	471	2.18	15.79	208	1019
18	1998	63	534	2.11	17.91	222	1213
19	1999	55	589	1.84	19.75	116	475
20	2000	55	644	1.84	21.60	92	820
21	2001	65	709	2.18	23.78	211	971
22	2002	89	798	2.98	26.76	279	1130
23	2003	122	920	4.09	30.85	521	1568
24	2004	117	1037	3.92	34.78	297	2131

25	2005	135	1172	4.53	39.30	306	1649
26	2006	143	1315	4.80	44.10	346	1655
27	2007	137	1452	4.59	48.69	219	1525
28	2008	135	1587	4.53	53.22	222	1488
29	2009	186	1773	6.24	59.46	288	1947
30	2010	196	1969	6.57	66.03	202	1158
31	2011	290	2259	9.73	75.75	213	1694
32	2012	259	2518	8.69	84.44	168	958
33	2013	269	2787	9.02	93.46	100	454
34	2014	195	2982	6.54	100.00	11	26

Authorship pattern of contributors

Table 2 shows the Authorship pattern of contributions

Year	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**Sum**
Single	0	0	1	1	2	1	2	3	5	1	1	1	2	0	1	4	4	0	1	30
Double	0	6	17	12	10	24	21	19	15	16	9	21	21	18	21	32	40	31	24	357
Triple	1	0	1	0	1	1	3	4	1	0	9	5	4	12	12	7	16	8	14	99
Four	0	0	0	0	1	2	0	2	0	2	3	5	2	9	8	9	3	15	10	71
Five	0	0	0	0	0	1	1	0	0	0	0	1	0	4	0	4	2	3	4	20
Six	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	4	0	7
Seven	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Eight	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	3
Nine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ten	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1**	**6**	**19**	**13**	**14**	**29**	**27**	**28**	**21**	**19**	**22**	**33**	**29**	**46**	**42**	**57**	**65**	**63**	**55**	**589**

Year	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**Sum**
Single	3	9	2	2	3	3	5	4	4	7	3	2	4	3	3	57
Double	21	19	31	22	32	37	20	40	31	43	46	45	45	55	31	518
Triple	12	10	9	21	21	24	36	35	31	45	42	58	60	57	33	494
Four	10	10	17	39	26	32	39	27	30	33	35	63	48	45	38	492
Five	5	12	20	21	19	23	36	20	15	21	33	63	39	28	32	387
Six	0	4	6	14	14	10	3	5	16	14	16	21	26	33	23	205
Seven	3	1	2	2	1	3	1	2	4	13	15	11	12	13	13	96
Eight	1	0	0	0	0	2	2	2	2	8	4	11	9	11	8	60
Nine	0	0	0	1	1	0	1	1	1	1	1	5	9	10	4	35
Ten	0	0	2	0	0	1	0	0	0	1	0	4	0	5	3	16
>10	0	0	0	0	0	0	0	1	1	0	1	7	7	9	7	33
Total	**55**	**65**	**89**	**122**	**117**	**135**	**143**	**137**	**135**	**186**	**196**	**290**	**259**	**269**	**195**	**2393**

Table 3 shows the consolidated Authorship pattern of contributions

Year	1981-1990	1991-2000	2001-2014	Total
Single	16	17	54	87
Double	140	238	497	875
Triple	12	99	482	593
Four	7	74	482	563
Five	2	23	382	407
Six	0	7	205	212
Seven	0	5	93	98
Eight	0	4	59	63
Nine	0	0	35	35
Ten	0	0	16	16
>10	0	0	33	33
Total				**2982**

Degree of Collaboration

Various methods have been the degree methods proposed to calculate the degree of research collaboration. Here in this study the formula proposed by Subramanyam (1983) has been used.

$$\mathbf{DC} = Nm/N_m + N_s$$

Where, DC = Degree of Collaboration

Nm = Number of Multiple Authored Papers

Ns = Number of Single Authored Papers

Therefore, **DC** = 2703/2703+84 = 0.96

Compound Annual Growth Rate (CAGR)

$$\mathbf{CAGR = (End\ Value/Beginning\ Value)^{(1/No.\ of\ Years)} - 1}$$

$$\mathbf{CAGR} = ((195/1)^{1/34} - 1$$

$$= 5.73\text{-}1$$

$$= 4.73$$

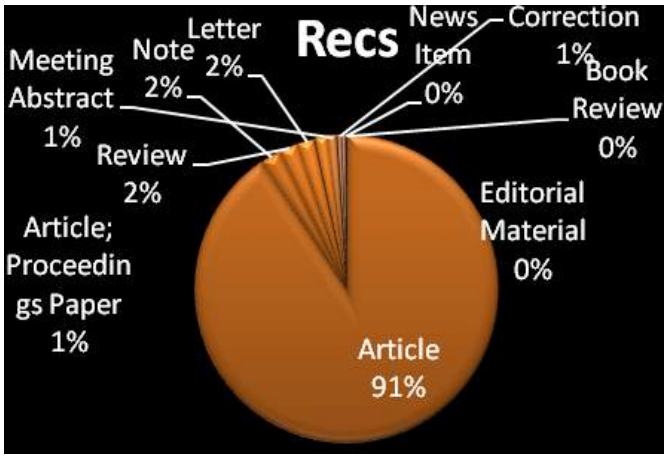
4.2 Document wise distribution of publications

Here, documents are arranged according to their types. In this count, Journal articles account for 90.5% share, and the predominate share in the distribution followed by Note(2.2%) and the remaining 7.3 % had appeared in many other publication types viz. Review, Letter, Proceedings, Meeting Abstract etc. (Table-2).

Table 4 shows the Document wise Distribution

S. No	Document Type	Recs	%	TLCS	TGCS
1	Article	2699	90.5	4675	24442
2	Note	66	2.2	65	387
3	Review	61	2.0	131	1415
4	Letter	55	1.8	51	228
5	Article; Proceedings Paper	41	1.4	62	338
6	Meeting Abstract	29	1.0	0	0
7	Correction	14	0.5	0	1
8	Editorial Material	11	0.4	2	26
9	News Item	4	0.1	0	0
10	Book Review	1	0.0	0	0

Figure 1 shows the Document wise distribution of contribution



Author wise Distribution of Bharathidasan University

Table 5 shows Top 15 Authors of Bharathidasan University

Sl.No	Author	Dep	Recs	%	TLCS	TGCS	TLCR	h-Index
1	Lakshmanan M	Phy	231	7.7	645	4178	508	35
2	Muthiah PT	Scho of Chem	139	4.7	497	1064	482	17
3	Ramamurthi K	Scho of Phy	123	4.1	140	923	153	14
4	Palaniandavar M	Chem	122	4.1	592	3467	566	32
5	Parthasarathi V	Life Sci	113	3.8	191	367	169	9

6	Venuvanalingam P	Scho of Chem	97	3.3	154	709	153	17
7	Akbarsha MA	Life Sci	94	3.2	159	954	256	16
8	Renganathan R	Scho of Chem	92	3.1	177	1209	173	21
9	Balasundaram C		90	3.0	157	681	158	14
10	Ganapathi A	Bio Tech	80	2.7	110	509	108	13
11	Dhanuskodi S	Phy	77	2.6	133	823	122	17
12	Arumugam S	Scho of Phy	73	2.4	19	283	18	8
13	Geraldine P	Animal Sci	72	2.4	110	669	104	16
14	Archunan G	Life Sci	69	2.3	143	334	146	11
15	Panchanatheswar-an K	Scho of Chem	67	2.2	81	473	84	12

Map Based on Networking:

Table 6 shows the Bibliographic Coupling - Authors of BDU & Fig 2 shows the label view of Author wise Distributions

Author	Documents	Bib. coupling
lakshmanan, m	231	4722.88
muthiah, pt	139	2871.94
palaniandavar, m	124	6398.50
ramamurthi, k	123	2733.35
parthasarathi, v	113	1415.44
venuvanalingam, p	97	3803.09
akbarsha, ma	94	3598.34
renganathan, r	92	3538.60
balasundaram, c	90	5187.14
ganapathi, a	80	2407.38
dhanuskodi, s	77	1253.64
arumugam, s	73	1161.73
geraldine, p	72	3192.70
archunan, g	69	2277.35
panchanatheswaran, k	67	1100.50

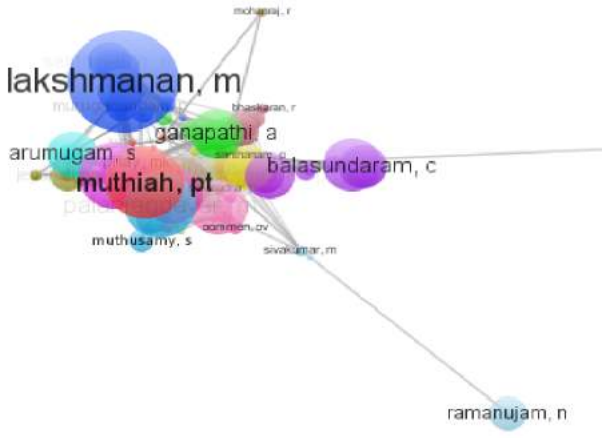


Figure 3 shows Cluster Density View - Authors of BDU

The above table and figure shows the Bibliographic Coupling of Authors of the Bharathidasan University. Both the cluster density view and label view also shown above using the Vos Viewer. From the analysis we came to the conclusion that M. Lakshmanan, Department of Physics has highest number of records 231 and h index of 35 followed by PT. Muthiah Department of school of chemistry has next highest publication of 139 and h index of 17 but M.Palaniandavar, Department of chemistry has 124 records with h index of 32.

Journal wise Distribution of Documents

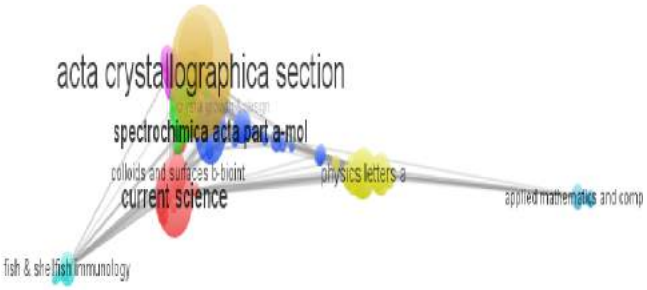
Table 7 shows the Top 15 Journals of Bharathidasan University

Sl.No	Journals	Records	Percent	TLCS	TGCS	TLCR
1	Acta Crystallographica Section E-Structure Reports Online	218	7.3	614	895	580
2	Current Science	99	3.3	68	326	43
3	Acta Crystallographica Section C-Crystal Structure Communications	87	2.9	227	489	150
4	Spectrochimica Acta Part A-Molecular And Biomolecular Spectroscopy	72	2.4	84	566	131
5	Physics Letters A	48	1.6	89	555	116
6	Physical Review E	46	1.5	85	1114	71
7	Indian Journal of Chemistry Section B-Organic Chemistry Including Medicinal Chemistry	37	1.2	59	194	96
8	International Journal of Bifurcation And Chaos	35	1.2	70	382	79
9	Journal Of Mathematical Physics	35	1.2	107	602	97
10	Tetrahedron Letters	29	1.0	59	173	61
11	Journal of Environmental Biology	28	0.9	20	98	30

12	Journal of Physics A-Mathematical And General	28	0.9	97	528	57
13	Dalton Transactions	27	0.9	85	377	206
14	Polyhedron	27	0.9	92	536	92
15	Colloids And Surfaces B-Biointerfaces	26	0.9	60	318	45

Table 8 shows the Bibliographic coupling of Sources & Figure 4 shows the Label View of Bibliographic coupling of Sources

Source	Documents	Bib. coupling
acta crystallographica section e-struct...	218	1647.13
current science	99	245.87
acta crystallographica section c-crystal...	87	1343.10
spectrochimica acta part a-molecular a...	72	952.88
physics letters a	48	818.08
physical review e	46	884.84
indian journal of chemistry section b-or...	37	226.85
international journal of bifurcation and...	35	520.09
journal of mathematical physics	35	568.19
tetrahedron letters	29	273.95
journal of environmental biology	28	135.90
journal of physics a-mathematical and ...	28	309.93
dalton transactions	27	1383.88
polyhedron	27	888.19
colloids and surfaces b-biointerfaces	26	259.06



The above table and figure shows the bibliographic coupling of the sources and its label view. Among various sources acta crystallograhica has highest documents and also having highest bibliographic coupling rate, followed by this current science has next highest number of documents and so on.

Organization wise Distribution of Documents

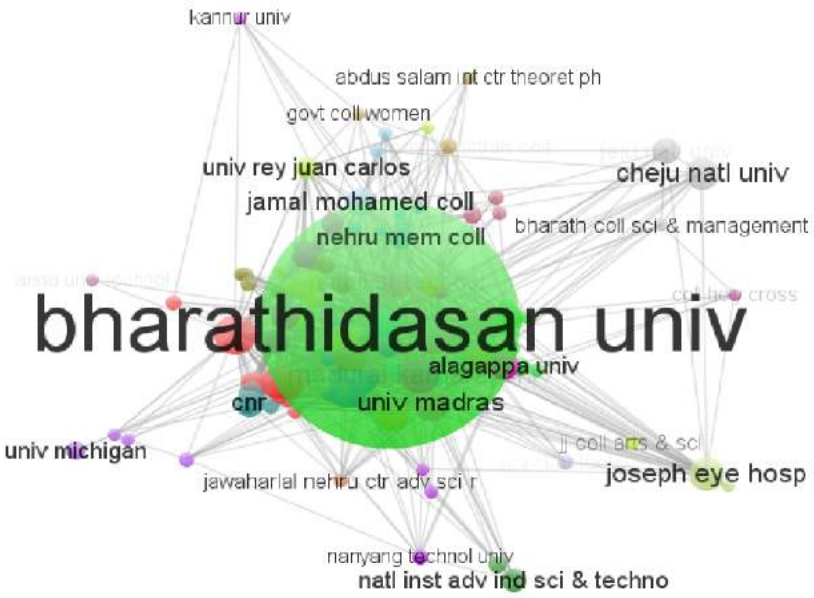
Table 9 shows the Top 15 Organization wise Distribution of Documents

Sl.No	Institution	Records	TLCS	TGCS
1	Anna University	55	37	286
2	Madurai Kamaraj University	50	41	106
3	University Madras	47	64	316
4	Indian Institute of Science	46	104	529
5	Joseph Eye Hospital	39	47	363
6	Cheju National University	38	87	309
7	Punjab University	38	88	123
8	University of Zurich	38	94	225
9	Annamalai University	36	13	146
10	Cent ral Salt & Marine Chemical Research Institute	36	132	495
11	Indian Institute of Technology	36	30	275
12	University of Neuchatel	32	65	584

13	National Institute of Technology	31	32	194
14	SRM University	31	19	89
15	Bharathiar University	30	17	204

Table 10 shows the Bibliographic coupling of Organization & Figure 5 shows the Label view - Bibliographic coupling of Organization

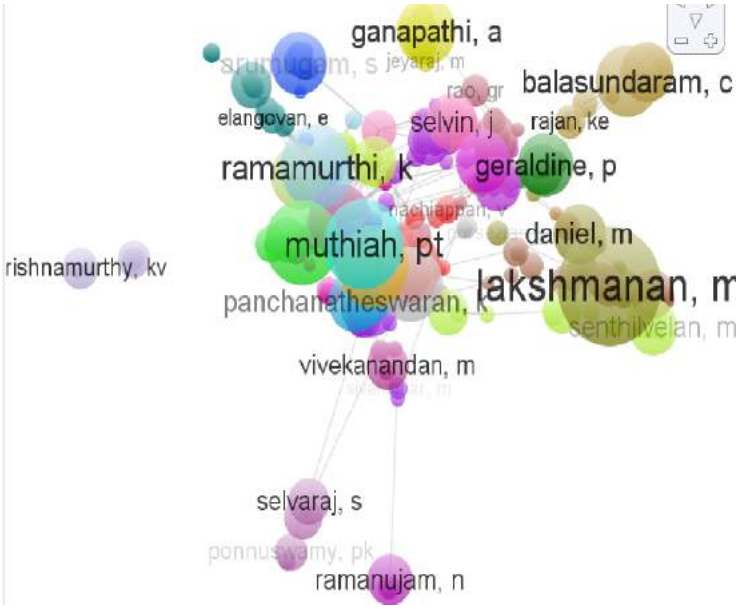
Organization	Documents ▼	Bib. coupling
bharathidasan univ	2694	47000.50
anna univ	55	2003.69
madurai kamaraj univ	50	1709.11
univ madras	47	1684.82
indian inst sci	46	1586.42
joseph eye hosp	39	2091.29
cheju natl univ	38	2627.69
panjab univ	38	587.27
univ zurich	38	1012.80
cent salt & marine chem res inst	37	2944.29
annamalai univ	36	1019.65
indian inst technol	36	1046.48
univ neuchatel	32	1376.14
natl inst technol	31	1164.73
srm univ	31	1128.93



The above table and figure shows the bibliographic coupling and the label view of organization wise distribution. Here the anna university has highest publications of 55 with the Bharathidasan University, next to that Madurai Kamaraj university has documents of 50 followed by university of madras has 47 and so on.

Table 11 shows the Co-authorship of authors & Figure 6 shows the Label view - Co-authorship of Authors

Author	Documents	Co-authorships
lakshmanan, m	231	208.00
muthiah, pt	139	126.00
palaniandavar, m	124	104.00
ramamurthi, k	123	118.00
parthasarathi, v	113	112.00
venuvanalingam, p	97	87.00
akbarsha, ma	94	70.00
renganathan, r	92	89.00
balasundaram, c	90	81.00
ganapathi, a	80	75.00
dhanuskodi, s	77	74.00
arumugam, s	73	64.00
geraldine, p	72	66.00
archunan, g	69	57.00
panchanatheswaran, k	67	63.00



The above table and figure shows the Co-Authorship of authors and label view of Authors. Author M. Lakshmanan has 231 documents has the co-authorships of 208 followed by Pt. Muthaih has 139 documents with 126 and so on.

Findings and Suggestions

- There is no much variation in the early output up to 2000 but from 2002 onwards there is significant development in the research output of the Bharathidasan University but as compare to the other Research Institution/ Organization we have to still improve research performance in the productivity.
- Contribution of multiple authors is dominating with major contribution of double and three authors; so there is a need of promoting further collaboration.

Conclusion

Research Productivity in the Bharathidasan University among the faculty is significantly high. Though the study started in recent decade but there is really an optimistic growth in the research productivity. Production is the real asset for our institution but as compare to other organization/ Institution still we need to improve the research performance in a way enormous way.

References:

- **Raja,S Balasubramani,R, (2011)** Plasmodium Falciparum Research Publication in India: A Scientometric Analysis, *European Journal of Scientific Research*
- **Raja,S Balasubramani,R, (2011)** Scientometric study of the Research Publication on Malaria 2003-2007: A Global perspective, *International Research Journal of Library Information and Archival Studies,* Vol:1,issue:3,pp 114-125.
- **P Sivaraman, S Sivaraj, M Surulinathi (2007)** A Scientometric Mapping of Research Performance on Nanotechnology: The Indian perspective, *Indian Journal of Information Science and Services,* pp 68
- **Surulinathi, M., Balasubramani, R., Kalisdha, A.,(2013)** Continent wise Analysis of Green Computing Research: A Scientometric Study, *Journal of Advances in Library and Information Science.* Vol: 2, issue: 1, pp 39-44.
- **Balasubramani, R, Ranganathan,C, (2013)** Mapping of Green Chemistry Research in India: A Scientometric Analysis, *Journal of Advances in Library and Information Science,* Vol:2, pg 221-229.