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## Research Productivity of Faculty in Christian Institutions in Tamil Nadu: A Bibliometric Analysis

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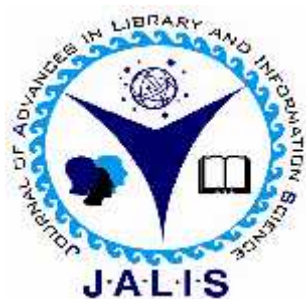
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*Bibliometric analysis of research publications by the Faculties in Christian institutions in Tamil Nadu using Web of Science database from 1989 to 2016. In this study Most of the paper published in the year 2016 with 225 records, JebaSR is the topmost author, Relative growth rate (RGR) was found to be fluctuating trend during the study period. The doubling time (DT) was found to be increased and decreased trend in this study. The degree of collaboration is 0.98. Most of the paper published in the Christian institution is Karunya University; South Korea is a major international collaboration partner in Christian Institutions in Tamil Nadu*

AIACHE, Bibliometrics, Scientometrics, Total Local Citation Score, Total Global Citation Score.

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## INTRODUCTION

Bibliometrics is a type of research method widely used in Library and Information Science. It utilizes quantitative analysis and statistics to describe patterns of publications within a given field or body of literature<sup>1</sup>. The Christian missionaries played a vital role in the shaping of India and they continue to contribute to the Indian Society in various aspects right from the British rule. The prevailing modern Indian education system was the design of British. The Christian religious bias cannot be ruled out during the British rule. This study is a bibliometric analysis of research publications of faculties in Christian institutions in Tamil Nadu. This will provide a bird's eye view of the publication trends of faculties and researchers working in Christian institutions in Tamil Nadu. From the review of previous literature in the Bibliometrics, one can see numbers of studies on various aspects. These studies have dealt with Publication contributions of individuals / departments / groups / institutions / countries; Collaboration patterns among authors / institutions / countries; Source journals / Preferred journals and so on. Dutt, B., and Nikam, K (2015)<sup>2</sup> carried out a study on scientometric overview of collaboration pattern in global solar cell research. Velmurugan C. and Radhakrishnan N (2015)<sup>3</sup> examined Scientometric observations of Authorship Trends and Collaborative Research on DESIDOC Journal of Library and Information Technology. Baskaran, C. (2013)<sup>4</sup> examined bibliometric analysis Research productivity of Alagappa University during 1999-2011 based on the data retrieved from the web of science. Jeysankar, R., Ramesh Babu, B., and Rajendran, P. (2011)<sup>5</sup> analyzed research output of CSIR-central electrochemical research institute (CECRI). Krishnan, V., and Raja, S. (2015)<sup>6</sup> examined Research productivity of Journal of Optics. Kumar, A., Bansal, J., Gupta, B. M., & Joshi, M. K. (2017), Khan, N. A., & Ahangar, H. (2015), Sevukan, R., & Sharma, J. (2008), Gopikuttan, A., & Aswathy, S. (2014) and Khanna, S., Singh, N. K., Tewari, D., & Saini, H. S. (2017) the above authors discussed in different aspect of institution research publication in India.

## OBJECTIVE OF THE STUDY

1. To examine the year wise distribution of publications.
2. To identify most prolific authors in Christian Institutions in Tamil Nadu

3. To identify the choice of the journals of the authors for the publication of their research findings
4. To study the publication pattern of researcher of Christian Institutions in Tamil Nadu
5. To analyze the International collaborations of the researchers of Christian Institutions in Tamil Nadu.

## METHODOLOGY

The present study data were collected from the web of science database for the period 1989-2016. The numbers of Christian institutions in Tamil Nadu were taken from All India Associations of Christian Higher education member Institutions only. There are 70 AIACHE Member institutions in Tamil Nadu 25 Institution available from Web of Science Database from It can be seen that nearly 1408 records of contribution in the field of Christian Institutions in Tamil Nadu over the period of 28 years. The collected data were analyzed with Hiscite, Manual, Microsoft excel sheet and presented in the form of tables

## RESULT AND DISCUSSION

### Growth of publication

As indicated in the table 1 Christian Institutions in Tamil Nadu has contributed 4108 publication during 1989-2016. The year wise analysis reveals that the year 2016 has the highest number of publications 225, and the year 1989 is the of lowest publication with 1. It can be observed that there is a fluctuation in the contributions of the papers during 1986 to 2016.

**Table 1:** Year wise output of Christian Institutions in Tamil Nadu

S.No	Publication Year	Records	%	Mean	Median	Mode	Range
1	1989	1	0.07	50.28	10	3	225
2	1990	0	0				
3	1991	0	0				
4	1992	4	0.29				
5	1993	3	0.21				
6	1994	3	0.15				
7	1995	2	0.15				
8	1996	2	0.29				
9	1997	4	0.78				
10	1998	11	0.50				
11	1999	11	0.56				
12	2000	7	0.63				

13	2001	8	0.50				
14	2002	9	1.06				
15	2003	7	0.21				
16	2004	15	1.06				
17	2005	3	0.21				
18	2006	16	1.13				
19	2007	30	2.13				
20	2008	83	5.9				
21	2009	72	5.11				
22	2010	96	6.81				
23	2011	108	7.67				
24	2012	112	7.95				
25	2013	173	12.29				
26	2014	187	13.28				
27	2015	216	15.34				
28	2016	225	16				
	Total	1408	100				

### Relative Growth Rate and Doubling Time

Table 2 indicates the sequential distribution relative growth rate and doubling time of Christian Institutions in Tamil Nadu 1989 – 2016. It is that the RGR value has been decreased (1.61-0.17), but DT value is being increased (0.43–4.07).

**Table 2:** Relative Growth Rate and Doubling Time

Year	No. of Article Publish	Cumulative	W1	W2	RGR	Doubling Time
1989	1	1	0.00	0.00	0.00	0.00
1990	0	1	0.00	0.00	0.00	0.00
1991	0	1	0.00	0.00	0.00	0.00
1992	4	5	0.00	1.61	1.61	0.43
1993	3	8	1.61	2.08	0.47	1.47
1994	3	11	2.08	2.40	0.32	2.18
1995	2	13	2.40	2.56	0.17	4.15
1996	2	15	2.56	2.71	0.14	4.84
1997	4	19	2.71	2.94	0.24	2.93
1998	11	30	2.94	3.40	0.46	1.52
1999	11	41	3.40	3.71	0.31	2.22
2000	7	48	3.71	3.87	0.16	4.40
2001	8	56	3.87	4.03	0.15	4.50
2002	9	65	4.03	4.17	0.15	4.65
2003	7	72	4.17	4.28	0.10	6.78
2004	15	87	4.28	4.47	0.19	3.66
2005	3	90	4.47	4.50	0.03	20.44
2006	16	106	4.50	4.66	0.16	4.24

2007	30	136	4.66	4.91	0.25	2.78
2008	83	219	4.91	5.39	0.48	1.45
2009	72	291	5.39	5.67	0.28	2.44
2010	96	387	5.67	5.96	0.29	2.43
2011	108	495	5.96	6.20	0.25	2.82
2012	112	607	6.20	6.41	0.20	3.40
2013	173	780	6.41	6.66	0.25	2.76
2014	187	967	6.66	6.87	0.21	3.22
2015	216	1183	6.87	7.08	0.20	3.44
2016	225	1408	7.08	7.25	0.17	4.07

### Most Prolific Authors in AIACHE Member Institutions in Tamil Nadu

Table 3 reveals that ranking wise publication of authors, Jeba SR is the first rank of the most prolific author with 54 papers, Second in the rank was Vijayalakshmi K42 papers, followed by NandhakumarR are 37 papers.

**Table 3:** Top 15Most Prolific Authors in Christian Institutions in Tamil Nadu

S.No	Author	Records	TLCS	TGCS
1	Jebas SR	54	8	98
2	Vijayalakshmi K	42	63	222
3	Nandhakumar R	37	61	493
4	Fun HK	36	3	82
5	Raj AME	34	47	437
6	Enoch IVMV	31	54	151
7	Guruvayoorappan C	31	39	221
8	Sanjeeviraja C	31	47	476
9	Wesley SG	29	24	122
10	Ravidhas C	28	37	300
11	Dinaharan I	26	16	306
12	Mahalingam T	23	7	131
13	Jayachandran M	22	40	421
14	Kanna T	22	12	258
15	Velmurugan K	22	22	178

### Authorship Pattern

Table 4 reveals that authorship pattern wise publication majority of the paper is double authored papers 39.06%, followed by three authored papers 20.81%, four authored papers 18.33%, more than four authored papers 19.89% and single-authored paper is very least 1.91%.

**Table 4:** Authorship Pattern

Year	Records	Authorship Pattern				
		Single	Double	Triple	Four	>Four
1989-1993	8	0	4	1	2	1
1994-1999	33	4	15	7	4	3
2000-2005	49	4	16	11	10	8
2006-2010	297	10	72	65	68	82
2011-2016	1021	9	443	209	174	186
<b>Total</b>	<b>1408</b>	<b>27</b>	<b>550</b>	<b>293</b>	<b>258</b>	<b>280</b>
<b>Percentage</b>		<b>1.91%</b>	<b>39.06%</b>	<b>20.81%</b>	<b>18.33%</b>	<b>19.89%</b>

### Degree of collaboration

Table 5 reveals that degree of collaboration during the period 1989-2016 degree of collaboration is 0.98

**Table 5:** Degree of collaboration

Period	Non Collaboration (NS)	Collaboration (NM)	Degree of Collaboration DC=NM/(NM+NS)
1989-2016	27	1381	<b>0.98</b>

### Scattering of Articles in Different Journals

The table 5 reveals the top fifteen journals of Christian Institutions in Tamil Nadu research literature enlisted for 28 years spanning from 1989-2016. The cumulated records for the 26 years period revealed that, out of sum total 1408 journals which published database on web of science the Christian Institutions in Tamil Nadu research literature output, 15 journals formed the core list most of the author published in the paper from the journal is *Acta Crystallographica* Section E-Structure Reports Online with 56 papers. The second rank of author published journal is *Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy* with 36 papers followed By Christian Institutions in Tamil Nadu with 31 papers.

**Table 6:** Top 15 Scattering of Articles in Different Journals

S.No	Journal	Records	TLCS	TGCS
1	ActaCrystallographica Section E-Structure Reports Online	56	8	92
2	SpectrochimicaActa Part A-Molecular And Biomolecular Spectroscopy	36	22	357
3	Christian Institutions in Tamil Nadu	31	22	100
4	Superlattices and Microstructures	18	12	42
5	Rsc Advances	17	15	91
6	Asian Journal of Chemistry	13	0	2
7	Current Science	13	5	65
8	Materials Science in Semiconductor Processing	13	10	107
9	Asian Pacific Journal	12	8	87

	of Cancer Prevention			
10	Ceramics International	12	27	136
11	Journal of Molecular Structure	12	4	34
12	Journal of Nanoscience And Nanotechnology	12	3	31
13	Plant Archives	12	0	2
14	Immunopharmacology and Immunotoxicology	11	20	93
15	Ionics	11	0	62

#### Cited references

Table 7 reveals that top 15 cited references of Christian institutions in Tamil Nadu.the highest level of cited reference is SheldrickGm, 2008, ActaCrystallogr A with 58 records followed by Bruker, 2005, Apex2 Saint Sadabs with 32 records and Spek Al, 2003, J ApplCrystallogr with 30 records.

**Table 7:** Top 15 Cited References

S. No	Author / Year / Journal	Records	Percentage
1	Sheldrick GM, 2008, ACTA CRYSTALLOGR A, V64, P112, DOI 10.1107/S0108767307043930	58	15.64
2	ALLEN FH, 1987, J CHEM SOC PERK T 2, pS1, DOI 10.1039/p298700000s1	35	9.44
3	Bruker, 2005, APEX2 SAINT SADABS	32	8.62
4	Spek AL, 2003, J APPL CRYSTALLOGR, V36, P7, DOI 10.1107/S0021889802022112	30	8.08
5	KERESZTURY G, 1993, SPECTROCHIM ACTA A, V49, P2007	22	5.93
6	LOWRY OH, 1951, J BIOL CHEM, V193, P265	22	5.93
7	GREEN LC, 1982, ANAL BIOCHEM, V126, P131, DOI 10.1016/0003-2697(82)90118-X	21	5.66
8	Spek AL, 2009, ACTA CRYSTALLOGR D, V65, P148, DOI 10.1107/S090744490804362X	21	5.66
9	BERNSTEIN J, 1995, ANGEW CHEM INT EDIT, V34, P1555, DOI 10.1002/anie.199515551	20	5.39
10	REED AE, 1988, CHEM REV, V88, P899, DOI 10.1021/cr00088a005	20	5.39
11	Varsanyi G, 1969, VIBRATIONAL SPECTRA	19	5.13
12	Kanna T, 2001, PHYS REV LETT, V86, P5043, DOI 10.1103/PhysRevLett.86.5043	18	4.85
13	OHKAWA H, 1979, ANAL BIOCHEM, V95, P351, DOI 10.1016/0003-2697(79)90738-3	18	4.85
14	Sundius T, 2002, VIB SPECTROSC, V29, P89, DOI 10.1016/S0924-2031(01)00189-8	18	4.85
15	Kanna T, 2003, PHYS REV E, V67, DOI 10.1103/PhysRevE.67.046617	17	4.58
	<b>Total</b>		<b>100</b>

### Document type wise Research output

Table 8 indicates the document wise distributions of publications of Christian Institutions in Tamil Nadu. Those documents are classified into 15 categories according to the nature of the publication. The data from the table reveals that most prevalent form of publication is a journal article 1272. Article; Proceedings paper as a source of research publication takes second place in the order 34. lowest document wise publication are Biographical-Item and Retraction are each 1. It could be noted from the analysis that authors from the Christian Institutions in Tamil Nadu have contributed more in the form of the journal article.

**Table 8:** Document type wise Research output

S.No	Document Type	Records	TLCS	TGCS
1	Article	1272	664	8045
2	Article; Proceedings Paper	34	26	191
3	Meeting Abstract	30	0	0
4	Review	28	14	309
5	Letter	22	0	22
6	Editorial Material	9	0	4
7	Correction	4	0	3
8	Note	3	3	6
9	Book Review	2	0	0
10	News Item	2	0	0
11	Biographical-Item	1	0	0
12	Retraction	1	0	0

### Institutions wise Research output

Table 9 indicates the Institutions wise Research output of Christian Institutions in Tamil Nadu. Karunya University, Coimbatore gets the first position of Institution wise research output with 749 publications, Bishop Heber College, Trichy gets the second place with 210 publications, followed by Scott Christian College, Nagercoil gets the third place with 169 publications.

**Table 9:** Top 15 Institutions wise Research output

S.No	Institution	Records	Percentage
1	Karunya University	749	54
2	Bishop Heber College	210	15.17
3	Scott Christian College	169	12.2
4	Christian Med College Vellore	45	3.25
5	Stella Maris College	42	3.03
6	Nesamony Memorial Christian College	38	2.76
7	Auxilium College	30	2.18
8	Popes College	26	1.9
9	Ananda College	17	1.23
10	American College	11	0.8
11	Annai Velankani College	11	0.8
12	Judes College	11	0.8
13	Lady Doak College	9	0.65
14	Loyola College	9	0.65
15	Sarah Trucker College	8	0.58
	<b>Total</b>	<b>1385</b>	<b>100</b>

### International collaboration of Research output

The table 10 details with collaborative efforts of authors of Christian Institutions in Tamil Nadu with different countries. It is found that the results of research in Christian Institutions in Tamil Nadu research literature growth collaborated from top 15 countries of which South Korea ranked first forming 28 publication counts. Second in the rank order was Malaysia with 40 records and Japan in the third rank with 38 records.

**Table 10:** Top 15 International collaboration of Research output

S.No	Country	Records	Percentage
1	South Korea	58	17.10
2	Malaysia	40	11.80
3	Japan	38	11.20
4	Germany	36	10.62
5	USA	36	10.62
6	Peoples R China	26	7.67
7	UK	18	5.32
8	Saudi Arabia	16	4.72

9	Singapore	14	4.13
10	Thailand	14	4.13
11	Taiwan	11	3.24
12	Greece	9	2.66
13	Ireland	8	2.36
14	Spain	8	2.36
15	Australia	7	2.07
	<b>Total</b>	<b>339</b>	<b>100</b>

## CONCLUSION

This study is concluded with the following observations. 4108 research papers have been published by Christian Institutions in Tamil Nadu. Jebas SR is the leading author of 54 articles. Majority of the researchers prefer "Acta Crystallographica Section E-Structure Reports Online" (56 papers) followed by "Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy" (36 papers) for publishing their articles. Journal Articles are the predominant types of publications with 1272 items. Karunya University leads the State with 749 papers. Authors from South Korea have more collaborations with Christian Institutions in Tamil Nadu.

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