

Research Productivity of Library and Information Science Faculty: A Bibliometric Study of select Universities of Punjab and Chandigarh

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Abstract

The present study aims to bring out the research productivity of Library and Information Science faculty members working in the select universities of Punjab and Chandigarh. The study covers faculty members working on permanent basis in the department of Library and Information Science in Panjab University, Chandigarh (PU), Punjabi University, Patiala (PUP) and Guru Nanak Dev University, Amritsar (GNDU). The publication details of faculty members were obtained by visiting personally to universities. It is found that 514 publications are published till 31st, December 2014 and were analyzed in MS-excel by SPSS. It examines the research productivity by different ways like document type, authorship pattern and degree of collaboration. The study also examines the relative growth rate of publications and doubling time of publications.

Keywords: Authorship Pattern, Bibliometric/Scientometric Analysis, Degree of Collaboration, Doubling Time, Library and Information Science, Panjab University, Chandigarh, Punjabi University, Patiala And Guru Nanak Dev University, Amritsar, Relative Growth Rate.

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INTRODUCTION

Research productivity in higher education is gaining importance from the past one decade in India. Faculty members of the universities have two functions to perform, i.e., teaching and research. Research has now become the very significant aspect of scholarly communication involving theses, dissertations, conference proceedings, books, patents, journal articles, etc. It is important to undertake the analysis of the research output in the different discipline. The term 'Bibliometric' and 'Scientometric' were almost simultaneously introduced by Pritchard and Nalimov and Mulchenko respectively in 1969 [1] highlighted it as "the application of mathematical and statistical methods to books and other media of communication" [2] inferred bibliometrics as "quantitative analysis of the bibliographic features of a body of literature" [3] defined Bibliometrics as "the study of recorded human communications, such as books, websites, paintings and laws". Bibliometrics has now emerged as a well-established interdisciplinary research field. In this study authors use

different parameters and bibliometric indicators like document type, authorship pattern, degree of collaboration, relative growth rate of publications and doubling time of publications for comparative analysis of Panjab University, Chandigarh (PU), Punjabi University, Patiala (PUP) and Guru Nanak Dev University, Amritsar (GNDU).

Panjab University: Department of Library and Information Science

The Department of Library and Information Science was established in 1960. The Department offers Bachelor of Library and Information Sciences (1-year semester system) and Master of Library and Information Sciences of (1-year semester system) and Ph.D. in Library Science. When the data was collected, there were three faculty members in the Department of Library and Information Science [4].

Faculty Strength: Professor—1, Assistant Professor—2

Punjabi University: Department of Library and Information Science

The Department of Library and Information Science was established in 1969. It offers B.L.I.S. and M.L.I.S., Courses of one-year each and Ph.D. in Library Science. Admission to both the courses (B.L.I.S. and M.L.I.S) is exclusively based on the merit test [5, 6].

Faculty Strength: Professor—3, Assistant Professor—3.

Guru Nanak Dev University: Department of Library and Information Science

The Department of Library and Information Science was established in 1973. The Department offers Bachelor of Library Science and Master of Library Science Courses and Ph.D. in Library Science. When the data was collected, there were three faculty members in the Department of Library and Information Science (“Department of Library and Information Science, Guru Nanak Dev University, Amritsar,” n.d.).

Faculty Strength: Professor—1, Assistant Professor—2.

OBJECTIVES

- To analyze the distribution of documents.
- To examine the relative growth rate and doubling time of publications.
- To find out the degree of collaboration
- To analyze the authorship pattern

METHODOLOGY AND SCOPE

In this study, following methodology is used:

- *Data Collection Source:* Questionnaire
- *Document Type:* Articles, Conference papers and Books/Book Chapters only
- *Time Span:* Till 31st, December 2014
- *Subject Covered:* Library and Information Science
- *Department/University:* Department of Library and Information Science, Panjab University, Chandigarh, Punjabi University, Patiala and Guru Nanak Dev University, Amritsar.

Statistical Tools and Techniques

Relative Growth Rate

The relative growth rate and doubling time model developed [7] was applied to examine the growth rate of research publications. The

relative growth rate is increased in the number of publications per unit of time. A specified period of interval can be calculated from the following equations [8].

$$R(1-2) = \frac{W2-W1}{T2-T1}$$

where,

- R (1-2) is the mean relative growth rate over the specified period of interval.
- W1 = Log W1: (Natural log of initial number of publications).
- W2 = Log W2: (Natural log of final number of publications).
- T2-T1 = the unit difference between the initial time and final time.

Doubling Time

The researcher has used the Doubling Time (DT) model by to evaluate the growth rate of papers published. The D(t) is inversely proportionate to RGR. If the number of publications of a subject doubles during a given period, then the difference between the logarithm of the numbers at the beginning and at the end of the period must be the logarithms of the number 2. If one uses a natural logarithm, this difference has a value of 0.693. The corresponding doubling time for publications can be calculated by using the following formula.

$$\text{Doubling time (Dt)} = \frac{0.693}{R}$$

In other words the doubling time is the amount of time required for an outcome to double in size.

Degree of Collaboration

The degree of collaboration is defined as the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time. The formula suggested [9] is used. It is expressed as:

$$C = \frac{NM}{NM + NS}$$

Where,

- C = Degree of collaboration of faculty members
- NM = Number of multiple authored papers
- NS = Number of single authored papers

Limitations of the Study

The authors have considered the publication of presently working faculty members excluding those who have retired and working on contract basis.

Delimitations of the Study

The study is confined to a period till 31st, December 2014 and subject covered is Library and Information Science only.

RESULTS AND DISCUSSION

University-wise Distribution of Total Publications

Table 1: Distribution of Total Publications.

Type of Documents	PU	PUP	GNDU
Journal Articles (JL.)	78	47	66
Conference Proceedings (CP)	56	154	27
Books /Book Chapters (B/BC)	18	50	18
Total Publications	152	251	111

PU, Panjab University, Chandigarh; PUP, Punjabi University, Patiala; GNDU, Guru Nanak Dev University, Amritsar

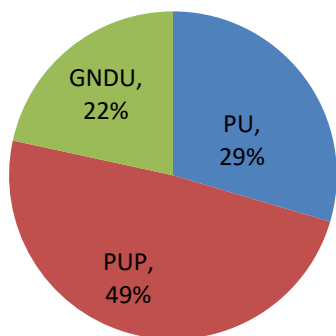


Fig. 1: University-wise Distribution of Total Publications.

Table 1 presents record of publications in journals, conference proceedings and book/book chapters published by PU, PUP and GNDU. PUP has contributed 48.83% in the total research productivity followed by PU, i.e., 29.57% and GNDU, i.e., 21.60%. It indicates that PU has published 51.32% articles in journals followed by 36.84% articles in conference proceeding and 11.84% articles in book/book chapters whereas PUP has published 61.35% articles in CP followed by 19.92%

articles in B/BC and closely followed by 18.73% articles in JL. On the other hand, GNDU has published 59.46% articles in JL. Followed by 24.32% articles in CP and 16.22% in B/BC. Tables 2–4 reveal that PU and GNDU have maximum publications in JL., whereas PUP has maximum publications in CP.

Year-wise Distribution of Total Publications

Year-wise Distribution of Preferred Communication Channel (Document Type) of PU

Table 2A: Year-wise Distribution of Total Publications of Panjab University, Chandigarh.

Year	DT			
	B/BC	CP	JL.	Total
1978–1990	0(0.0%)	0(0.0%)	0(0.0%)	0
1991–2000	5(23.8%)	5(23.8%)	11(52.4%)	21
2001–2010	6(11.1%)	27(50.0%)	21(38.9%)	54
2011–2014	7(9.1%)	24(31.2%)	46(59.7%)	77
Total	18(11.8%)	56(36.9%)	78(51.3%)	152

Chi-square value = 9.929; df = 4; p = 0.042

Year-wise Distribution of Preferred Communication Channel (Document Type) of PUP

Table 2B: Year-wise Distribution of Total Publications of Punjabi University, Patiala.

Year	DT			
	B/BC	CP	JL.	Total
1978–1990	0(0.0%)	0(0.0%)	1(100.0%)	1
1991–2000	15(25.4%)	31(52.6%)	13(22.0%)	59
2001–2010	27(19.0%)	95(66.9%)	20(14.1%)	142
2011–2014	8(16.3%)	28(57.2%)	13(26.5%)	49
Total	50(19.9%)	154(61.4%)	47(18.7%)	251

Chi-square value = 10.787; df = 6; p = 0.095

Year-wise Distribution of Preferred Communication Channel (Document Type) of GNDU

Table 2C: Year-wise Distribution of Total Publications of Guru Nanak Dev University, Amritsar.

Year	DT			Total
	B/BC	CP	JL	
1978–1990	0(0.0%)	0(0.0%)	2(100.0%)	2
1991–2000	2(9.1%)	6(27.3%)	14(63.6%)	22
2001–2010	12(23.1%)	14(26.9%)	26(50.0%)	52
2011–2014	4(11.4%)	7(20.0%)	24(68.6%)	35
Total	18(16.2%)	27(24.3%)	66(59.5%)	111

Chi-square value = 5.884; df = 6; p = 0.436

Tables 2A, 2B and 2C, highlight the year-wise publication of document type. For the convenience of the study and to achieve significant results, the whole study period is divided into 4 block years. The first block year comprises 1978–1990; second block year targets 1991–2000; third block year contains 2001–2010 and fourth block year consists of 2011–2014. For analyzing data excel sheet, SPSS (Statistical Product and Service Solution) is used and Chi-square is applied to find significant results. In year-wise distribution of communication channels, Table 2 depicts that p-value of PU is 0.042, which means, PU has significant variation among JL, CP and B/BC as p-value is less than 0.05 whereas p-value of PUP and GNDU is 0.095 and 0.436 which is more than 0.05, stating that PUP and GNDU have no significant variation among JL, CP and B/BC.

Year-wise Distribution of RGR and D(t) of Publications

RGR and D(t) of Panjab University, Chandigarh

Table 3A: Year-wise Distribution of RGR and D(t) of Panjab University, Chandigarh.

Year	F	CF	W2	W1	R	D(t)
1991	3	3	1.099	-	-	-
1992	1	4	1.386	1.099	0.288	2.409
1993	2	6	1.792	1.386	0.406	1.709
1994	2	8	2.079	1.792	0.288	2.409
1995	1	9	2.197	2.079	0.118	5.884
1996	5	14	2.639	2.197	0.442	1.569
1997	1	15	2.708	2.639	0.069	10.045

1998	4	19	2.944	2.708	0.236	2.932
1999	1	20	2.996	2.944	0.051	13.511
2000	1	21	3.045	2.996	0.049	14.204
2001	2	23	3.136	3.045	0.091	7.618
2002	4	27	3.296	3.136	0.160	4.322
2003	1	28	3.332	3.296	0.036	19.055
2004	3	31	3.434	3.332	0.102	6.809
2005	3	34	3.526	3.434	0.092	7.502
2006	9	43	3.761	3.526	0.235	2.951
2007	8	51	3.932	3.761	0.171	4.062
2008	9	60	4.094	3.932	0.163	4.264
2009	8	68	4.220	4.094	0.125	5.537
2010	7	75	4.318	4.220	0.098	7.073
2011	13	88	4.477	4.318	0.160	4.335
2012	29	117	4.762	4.477	0.285	2.433
2013	18	135	4.905	4.762	0.143	4.843
2014	17	152	5.024	4.905	0.119	5.843

RGR and D(t) of Punjabi University, Patiala

Table 3B: Year-wise Distribution of RGR and D(t) of Punjabi University, Patiala.

Year	F	CF	W2	W1	R	D(t)
1983	1	1	0	-	-	-
1993	1	2	0.693	0	0.693	1.000
1996	3	5	1.609	0.693	0.916	0.756
1997	15	20	2.996	1.609	1.386	0.500
1998	5	25	3.219	2.996	0.223	3.106
1999	12	37	3.611	3.219	0.392	1.768
2000	23	60	4.094	3.611	0.483	1.434
2001	24	84	4.431	4.094	0.337	2.060
2002	6	90	4.500	4.431	0.069	10.045
2003	14	104	4.644	4.500	0.145	4.793
2004	14	118	4.771	4.644	0.126	5.487
2005	12	130	4.868	4.771	0.097	7.155
2006	9	139	4.935	4.868	0.067	10.353
2007	12	151	5.017	4.935	0.083	8.369
2008	16	167	5.118	5.017	0.101	6.881
2009	20	187	5.231	5.118	0.113	6.127
2010	15	202	5.308	5.231	0.077	8.981
2011	7	209	5.342	5.308	0.034	20.343
2012	25	234	5.455	5.342	0.113	6.134
2013	12	246	5.505	5.455	0.050	13.857
2014	6	252	5.529	5.505	0.024	28.758

RGR and D(t) of Guru Nanak Dev University, Amritsar

Table 3C: Year-wise Distribution of RGR and D(t) of Guru Nanak Dev University, Amritsar.

Year	F	CF	W2	W1	R	D(t)
1987	1	1	0	-	-	-
1988	1	2	0.693	0	0.693	1.000
1994	1	3	1.099	0.693	0.406	1.709
1995	1	4	1.386	1.099	0.288	2.409
1996	1	5	1.609	1.386	0.223	3.106
1997	4	9	2.197	1.609	0.588	1.179
1998	5	14	2.639	2.197	0.442	1.569
1999	2	16	2.773	2.639	0.134	5.190
2000	8	24	3.178	2.773	0.406	1.709
2001	6	30	3.401	3.178	0.223	3.106
2002	3	33	3.497	3.401	0.095	7.271
2003	5	38	3.638	3.497	0.141	4.912
2004	7	45	3.807	3.638	0.169	4.099
2005	3	48	3.871	3.807	0.065	10.738
2006	5	53	3.970	3.871	0.099	6.994
2007	6	59	4.078	3.970	0.107	6.462
2008	5	64	4.159	4.078	0.081	8.519
2009	4	68	4.220	4.159	0.061	11.431
2010	8	76	4.331	4.220	0.111	6.231
2011	1	77	4.344	4.331	0.013	53.014
2012	6	83	4.419	4.344	0.075	9.236
2013	12	95	4.554	4.419	0.135	5.132
2014	16	111	4.710	4.554	0.156	4.452

Tables 3A, 3B and 3C indicate the growth of publications by PU, PUP and GNDU with the help of Relative Growth Rate (RGR) and Doubling time (D(t)). RGR is a measure to study the increase in the number of articles on time and the D(t) is inversely proportionate to RGR. It is the time required for articles to become double of the existing amount. PU has highest RGR and lowest D(t) in 1996, i.e., 0.442 and 1.569, respectively whereas PU has lowest RGR and highest D(t) in 2003, i.e., 0.036 and 19.055 respectively. PUP has highest RGR and lowest D(t) in 1997, i.e. 1.386 and 0.500 respectively whereas PUP has lowest RGR and highest D(t) in 2014, i.e., 0.024 and 28.758 respectively. GNDU has highest RGR and lowest D(t) in 1988 i.e., 0.0693 and 1.000 respectively whereas GNDU has lowest RGR

and highest D(t) in 2011 i.e., 0.013 and 53.014 respectively.

Year-wise Distribution of Authorship Pattern

Table 4A: Year-wise Authorship Pattern of Panjab University, Chandigarh.

Authors	Years				
	1978–1990	1991–2000	2001–2010	2011–2014	Total
Single	0(0.0%)	14(23.7%)	22(37.3%)	23(39.0%)	59(100.0%)
Double	0(0.0%)	7(7.8%)	32(35.5%)	51(56.7%)	90(100.0%)
Triple	0(0.0%)	0(0.0%)	0(0.0%)	3(100.0%)	3(100.0%)
Quadruple and More	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Total	0(0.0%)	21(13.8%)	54(35.5%)	77(50.7%)	152(100.0%)

Chi-square value = 76.750; df = 2; p = 0.001

Table 4B: Year-wise Authorship Pattern of Punjabi University, Patiala.

Authors	Years				
	1978–1990	1991–2000	2001–2010	2011–2014	Total
Single	0(0.0%)	21(17.2%)	71(58.2%)	30(24.6%)	122(100.0%)
Double	1(0.8%)	36(29.3%)	68(55.3%)	18(14.6%)	123(100.0%)
Triple	0(0.0%)	2(33.3%)	3(50.0%)	1(16.7%)	6(100.0%)
Quadruple and More	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Total	1(0.4%)	59(23.5%)	142(56.6%)	49(19.5%)	251(100.0%)

Chi-square value = 108.151; df = 2; p = 0.001

Table 4C: Year-wise Authorship Pattern of Guru Nanak Dev University, Amritsar.

Authors	Years				
	1978–1990	1991–2000	2001–2010	2011–2014	Total
Single	2(2.5%)	21(26.2%)	39(48.8%)	18(22.5%)	80(100.0%)
Double	0(0.0%)	1(3.6%)	13(46.4%)	14(50.0%)	28(100.0%)
Triple	0(0.0%)	0(0.0%)	0(0.0%)	2(100.0%)	2(100.0%)
Quadruple and More	0(0.0%)	0(0.0%)	0(0.0%)	1(100.0%)	1(100.0%)
Total	2(1.8%)	22(19.8%)	52(46.9%)	35(31.5%)	111(100.0%)

Chi-square value = 148.063; df = 3; p = 0.001

Table 5: University-wise Authorship Pattern and Degree of Collaboration.

Name of University	Single authored	Double authored	Three and More Authored	Degree of Collaboration	Total Documents
PU	59	90	3	0.612	152
PUP	122	123	6	0.514	251
GNDU	80	28	3	0.279	111
Total	261	241	12	0.492	514

PU, Panjab University, Chandigarh; PUP, Punjabi University, Patiala; GNDU, Guru Nanak Dev University, Amritsar

Tables 4A, 4B and 4C indicate year-wise distribution of authorship pattern of PU, PUP and GNDU. PU has maximum publications in the block year 2011–2014, i.e., 51(56.7%), whereas PUP has maximum publications in 2001–2010, i.e., 68(55.3%) as double authored and GNDU has maximum publications in the block year 2001–2010 as single authored. The p-value of PU, PUP and GNDU is 0.001, which is less than 0.05 at 5% level of significance. It can be inferred that there is significant variation among authorship pattern of these three universities.

University-wise Authorship Pattern and Degree of Collaboration

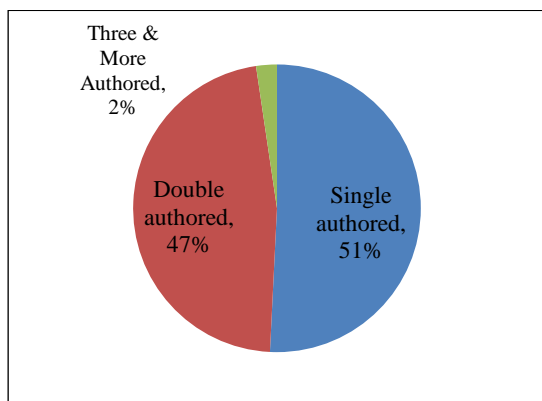


Fig. 2: Authorship Pattern.

In the light of the above Table 5, an attempt has been made to identify the nature of authorship pattern and their degree of collaboration in research output made in Department of library and Information Science, PU, PUP and GNDU. Figure 2 indicates that 51% publications are single authored closely followed by double authored, i.e., 47%. In university-wise distribution, PU has maximum publications as double authored, i.e., 90 publications and GNDU has maximum publications as single authored, i.e., 80. PUP has almost equal publications as single authored and double

authored, i.e., 122 publications and 123 publications respectively. The DC of PU is 0.612 followed by PUP and GNDU, i.e., 0.514 and 0.279 respectively. The overall DC of all the three universities is 0.492. It states that 49% of the total publications of these universities are in collaboration.

CONCLUSION

The study concludes that PU and GNDU have maximum publications in JI., whereas PUP has maximum publications in CP. PU has significant variation among JI., CP and B/BC whereas PUP and GNDU have no significant variation among JI., CP and B/BC. PU has highest RGR and lowest D(t) in 1996, i.e., 0.442 and 1.569 respectively whereas PU has lowest RGR and highest D(t) in 2003, i.e., 0.036 and 19.055 respectively. PUP has highest RGR and lowest D(t) in 1997, i.e. 1.386 and 0.500 respectively whereas PUP has lowest RGR and highest D(t) in 2014, i.e., 0.024 and 28.758 respectively. GNDU has highest RGR and lowest D(t) in 1988, i.e., 0.0693 and 1.000 respectively whereas GNDU has lowest RGR and highest D(t) in 2011, i.e., 0.013 and 53.014 respectively. PU, PUP and GNDU have significant variation among authorship pattern of these three universities. PU has maximum publications as double authored publications and GNDU has maximum publications as single authored. PUP has almost equal publications as single authored and double authored. The DC of PU is 0.612 followed by PUP and GNDU, i.e., 0.514 and 0.279 respectively. The overall DC of all the three universities is 0.492. It is concluded that 49% of the total publications of these universities are in collaboration.

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